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Mål, virkemiddel og effekt

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Journalen har hovedfokus på samfunnsvitenskapelig forskning med vekt på marked, ledelse, økonomi og statsvitenskap.

Innledning

Dette særnummeret av økonomisk fiskeriforsking markerer slutten på rammeprogrammet: Økt lønnsomhet i torskesektoren. Programmet har pågått siden 2011. Målsettingen har vært å utvikle kunnskap om hvorfor torskesektoren over tid har hatt svak lønnsomhet. Intensjonen har vært å bruke slik kunnskap til å utvikle tiltak som kan bidra til å øke torskesektorens konkurransekraft og lønnsomhet.

FHF, som har finansiert programmet, har understreket at midlene de bevilger skal rettes mot teknologiske fagområder, at prosjektene kommer direkte til nytte for næring og at leveransene har en populærvitenskapelig form. I dette programmet har de imidlertid gjort ett unntak. Her har det vært en uttalt målsetting om å utvikle et sterkt samfunnsvitenskapelig miljø med unik kompetanse om hvordan nasjonale offentlige reguleringer av fangst og produksjon fra ville bestander påvirker næringens internasjonale konkurransekraft, struktur og lønnsomhet.

I dette særnummeret oppsummeres de vitenskapelige bidragene fra programmet i en spisset og faglig form. Alle bidragene er publisert etter en grundig fagfellevurdering. Særnummeret er gitt tittelen *Mål, virkemiddel og effekt.*

I løpet av programmets femårige liv er det publisert en rekke faglige artikler med basis i problemstillinger og datamateriale fra programmet. Intensjonene med dette særnummeret er å samle disse fagbidragene og sette dem sammen på en strukturert måte. Vi har valgt å organisere utgivelsen på følgende måte. I første del, *Mål og virkemiddel*, diskuteres ulike offentlige virkemiddel og intensjonene med dem. Deretter har vi samlet alle publikasjonene som har vært opptatt av hvilken effekt virkemidlene har hatt i en del som er kalt *Strategisk tilpasning*. I den siste delen, *Sporbarhet og Bærekraft*, rettes oppmerksomheten mot ulike dimensjoner av bærekraft og metodikk knyttet til å måle bærekraft.

Mange av artiklene er tidligere publisert i *Økonomisk fiskeriforskning*. Disse har vært uproblematisk å trykke på nytt i sin helhet. Mange av artiklene er imidlertid publisert i andre fagtidsskrift hvor vi ikke har hatt tillatelse til å trykke dem her. Vi har derfor kun trykket sammendraget og linken til den fulle teksten hvor de er publisert. Mange mastergradsstudenter har fått tilgang på datamateriale, økonomisk støtte til innsamling av data og veiledning takket være programmet. Vi har derfor valgt å trykke sammendraget og linken til disse oppgavene.

Vi vil takke redaksjonen for oppdraget og redaksjonell hjelp til å sette sammen særnummeret. Vi vil takke Fiskeri- og havbruksnæringens forskningsfond (FHF) for økonomisk støtte og for å ha satset tungt på samfunnsvitenskapen. I hele programperioden har vi hatt utrolig stor nytte av å diskutere med næring og næringsorganisasjonene gjennom møter med styringsgruppe og referansegruppe. De har hele tiden sørget for at problemstillingene har hatt stor relevans for næring. Vi vil takke alle forfatterne for å ha bidratt til et særnummer som viser både omfang og faglig bredde i forskerteamet som på ulike måter har hatt kobling til programmet.

God lesing.

Tromsø, september

Bent Dreyer – Programleder

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Mål og virkemiddel

Fra krise til krise – forventninger og svik i norsk fiskerinæring*

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Abstract in Norwegian:
I denne artikkelen drøfter vi årsakene til at utviklingen i filetindustrien, spesielt i Finnmark, framstår som en sammenhengende krise. Den vanskelige situasjonen de siste tiårene står i kontrast til optimismen umiddelbart etter krigen. Da filetindustrien ble bygd opp med sterk offentlig medvirkning i etterkrigstiden, var det bred enighet om en strategi for modernisering og industrialisering av Nord-Norge generelt og Finnmark spesielt. Dette ga opphav til en storstilt satsing på filetindustrien, dels ved direkte støtte til etablering av produksjonsbedrifter, dels ved tilpasninger i rammebetingelsene for filetproduksjon. I artikkelen viser vi hvordan moderniseringsprosjektet bidro til å etablere en "samfunnskontrakt" der det offentlige, med filetindustrien og tilhørende trålere som virkemiddel, ble stående som garantist for sysselsetting og bosetting i distriktene.

Etter den sterke ekspansjonen på 1960-tallet har filet som produksjonsform gradvis tapt terreng. Antallet norske bedrifter med filet som viktigste produksjonsform har blitt redusert fra 100 på begynnelsen av 1970-tallet til 10 i 2012. Forklaringene på tilbakegangen er sammensatt og handler om sterk konkurranse i markedene, bortfall av subsidier, uthuling av trålernes leveringsplikt, globalisering av produksjonen og handel med fiskevarer og et svært høyt norsk kostnadsnivå. Når denne industrien bygges ned, støter det an mot de sterke forventingene som ble etablert i den gamle "samfunnskontrakten". Den permanente krisen er uttrykk for spenningsforholdet som oppstår ved at filetbedriftene forventes å ivareta et samfunnsansvar samtidig som de skal være konkurransedyktige aktører i et globalisert fiskevaremarked.

Abstract in English:
In this article we will discuss the reasons why the fillet processing industry, particularly in Finnmark, is in a continuous state of crisis. The difficult situation the last decades contrasts sharply against the optimism after World War II, when the fillet processing industry was built up with massive support from the government. In the post war period, there was a broad consensus of the need for modernization and industrialization in North Norway. This made the foundation for a strong public commitment to fillet processing industry, in part by direct support to the establishment of fillet processing plants, in part by important adjustments to the institutional and legal framework for the processing industry. The article shows how the modernization project contributed to the establishment of a "social contract", according to which the government, with fillet processing industry and trawler technology as instruments, accepted responsibility for employment and settlement in the coastal communities.

After the strong expansion in the 1960s, white fish fillet has lost shares of the Norwegian export. The number of businesses with fillets as the main production has been reduced from 100 in the early 1970s to 10 in 2012. The explanations on the decline is complex and includes factors like strong competition in the markets, the termination of subsidies, undermining of the trawlers obligations to land fish to a specific processing plant, globalization of production and trade of seafood, and very high Norwegian production costs. When the industry is in decline, it runs against the strong expectation established in the old "social contract". The permanent crisis is a result of the tension created when the fillet processing industry is held to the social responsibilities to coastal communities at the same time as they must be competitive actors in a global seafood market.

*Dette arbeidet er en del av Torskeprogrammet, finansiert av Fiskeri- og havbruksnæringens forskningsfond.
NB! Vi har utført en rettelse - Figur 5 i denne artikkelen er ny.

> *"Sendes til Kina: Det koker av fisk i havet og det landes kjempefangster, men likevel er det krise for landanleggene langs kysten". (Endresen, 2011)*

Sitatet over er hentet fra en artikkel i *Dagens Næringsliv* høsten 2011. Oppslaget tok utgangspunkt i et paradoksalt faktum: I en landsdel med et åpenbart komparativt fortrinn, nærheten til ett av verdens rikeste fiskefelter, har det vist seg vanskelig å opprettholde en bærekraftig foredlingsindustri. I stedet foregår videreforedlingen i økende grad i Kina. Utgangspunktet for oppslagene høsten 2011 var at Aker Seafoods, Norges største industrikonsern innen hvitfisksektoren, vedtok å skille rederidrift og landindustri fra hverandre. Dette har utløst frykt for at råstofftilgangen til den landbaserte filetproduksjonen vil svekkes ytterligere. I et leserinnlegg i *Nordlys* mante Ingalill Olsen, stortingsrepresentant fra Finnmark for Arbeiderpartiet, til kamp: "Røkke og Co. er på vei ut av Finnmark med trålkonsesjonene. Men dette ranet av Finnmark skal ikke skje uten sverdslag" (Olsen, 2011). Fylkeslederen i Kommunenes Sentralforbund i Finnmark, Kristina Hansen, følger opp i samme avis og krever at Aker Seafoods opprettholder sine forpliktelser og leverer torsk som bearbeides i kystsamfunnene i Finnmark: "Sentrale myndigheter må sørge for at industrikvotene ikke flagges ut av fylket" (Hansen, 2011).

Problemene i fiskeindustrien i nord er sammensatte og har sterke politiske og symbolske overtoner. Det som startet med et spørsmål om intern foretaksstrategi – hvorvidt Aker skal organisere fartøyer og landanlegg sammen eller hver for seg – utløser raskt problemstillinger av offentlig interesse: Hvordan vil det påvirke leveringsforpliktelser og landingsmønster? Betyr en fristilling av trålerne tap av arbeidsplasser langs kysten? Er betingelsene for at Aker i sin tid fikk tillatelse til å overta industrianlegg og trålere nå brutt, slik at konsesjonene bør trekkes tilbake? Det reiser også et mer generelt spørsmål om trålernes legitimitet og plass i fiskerinæringen. I sin tid var oppbyggingen av en trålerflåte begrunnet med å sikre stabil tilførsel av fiskeråstoff til filetindustrien på land. Hvis trålerne nå, innen rammen av en globalisert økonomisk orden, ikke lenger bidrar til å sikre råstofftilførselen til fiskeindustrien er det kanskje grunn til å tenke gjennom saken en gang til?

I denne artikkelen vil vi se nærmere på den historiske utviklinga til norsk filetindustri, med særlig vekt på Nord-Norge. Vår grunnleggende problemstilling angår det paradoks vi startet med: Mens det koker av fisk i havet, er det krise i fiskeindustrien på land. Hvorfor er det slik? En viktig del av forklaringen er selvsagt de gjennomgående svake økonomiske resultater. Når den samlede norske eksporten av torskefilet reduseres, når antall arbeidsplasser i industrien minsker, når rekken av filetbedrifter som går over ende blir lengre, er det fordi driften ikke svarer seg. Lønnsomhetsproblemet er likevel ikke hele forklaringen. At filetindustrien går fra krise til krise skyldes ikke at den sliter økonomisk – det er en normal del av tilpasningsprosessen i norsk økonomi. Krisen i filetindustrien, skal vi hevde, stikker dypere og er av et annet slag. Hypotesen som utdypes og undersøkes i det følgende er at denne krisen oppstår i et vedvarende avvik mellom de samfunnsmessige forventninger som stilles til denne sektoren og dens fattigslige resultater. Når filetindustrien går fra krise til krise er det altså ikke primært et lønnsomhetsproblem, men fordi det stilles så høye forventninger til denne sektoren. Mens fiskeindustriens svake resultater dermed inngår som en del av bildet, er det altså den andre enden av problemet vi skal undersøke: Hvorfor vedlikeholdes forventningene til filetindustrien til tross for alle erfaringer som viser at dette er urealistisk?

Gangen i artikkelen er slik: I det første avsnittet beskriver vi hvordan filetindustrien ble til i etterkrigstida. Et hovedpoeng her er å vise at filetindustrien ble etablert som ledd i et politisk prosjekt for modernisering

av den nordlige landsdelen. Dette er direkte relevant for filetindustriens samfunnsmessige posisjon, særlig i Nord-Norge. Filetindustrien ble konstruert for å være en samfunnsbærende sektor. Resultatet av prosjektet var ikke bare at en ny industrisektor ble etablert. Samtidig ble det etablert en samfunnskontrakt som skulle vise seg å være mer seiglivet enn de bedriftene den var myntet på.

I de neste to avsnittene tar vi for oss filetindustriens lønnsomhetsproblem. Et hovedpoeng her er de store endringer i filetindustriens rammebetingelser fra etableringsperioden på 1950- og 60-tallet og fram til i dag. Den gang filetindustrien ble bygget opp, var det innenfor et havrettsregime med fri adgang til fiskeressursene, og et proteksjonistisk handelsregime uten sterke restriksjoner mot subsidier og andre konkurransevridende tiltak. Innenfor disse rammene kunne en etablere en filetindustri basert på torskeråstoff uten tanke på kapasitetsspørsmål på sjø og land, og med storstilte statlige subsidier som sentrale virkemidler. Resultatet var en filetindustri med betydelig overkapasitet, og som kunne overleve uten sterk konkurransekraft i internasjonale markeder. Fra 1980-tallet og fram til i dag har imidlertid rammebetingelsene endret seg radikalt. Påskyndet av et nytt internasjonalt havrettsregime, som skiftet tyngdepunktet i verdens sjømatindustri fra nord til sør og fra vest mot øst, må norsk filetindustri nå konkurrere som en funksjonell del av et globalt hvitfiskmarked. I dette markedet, som forsynes av råstoff fra mange ulike fiskerier verden rundt, er det foredlingsbedriftene i Kina som setter industristandarden. Resultatet av denne konkurransesituasjonen kan tydelig avleses på bedriftenes bunnlinjer og i konkursstatistikken: Det går nedover. Filetproduksjon flyttes ut. Råstoffet tar andre veier til markedene enn via norske kuttelinjer.

I det fjerde avsnittet vender vi tilbake til kjernen i det paradokset vi startet med: Hvorfor er det permanent krise i norsk filetindustri? Hvorfor vedlikeholdes forventningen om å være ryggraden i kystsamfunnene til en sektor som knapt kan bære sine egne kostnader? For å kunne besvare slike spørsmål, gir vi en analyse av hva forventningene til filetbedriftene går ut på og hvordan de kommer til uttrykk. Vi gjør det ved hjelp av begrepet om en "samfunnskontrakt", det vil si det samlede knippe av forventninger og krav som gjøres gjeldende i forholdet mellom en sektor og det omliggende samfunn. Et hovedpoeng i analysen er at samfunnskontrakten i fiskerisektoren ikke er entydig: Mens kravene i det nasjonale og de internasjonale markeder til effektivitet og konkurransekraft er sterke og klare, vedlikeholdes samtidig forventningene om at filetindustrien skal være en samfunnsbærende sektor. Det er i samspillet mellom krav som er vanskelige å forene som gjør at krisen i filetindustrien blir permanent.

Frossenfisk og modernisering

Oppbyggingen av en filetindustrien stod sentralt i strategien for moderniseringen av Nord-Norge i etterkrigstida. Den grunnleggende analysen av problemet, både når det gjaldt lønnsomheten i fiskeriene og strukturen i nordnorsk næringsliv mer generelt, var etablert allerede i mellomkrigstiden. Et utgangspunkt for denne analysen var det, som i en innstilling fra Stortingets Kjøle- og Fryserikomité i 1931, ble kalt *fiskernes prisproblem* (Finstad, 2005:32; Finstad, 2010). Mens det norske torskefisket var det største i Europa med dobbelt så store fangster som den neste på lista, Storbritannia, oppnådde norske fiskere under halvparten av den prisen britiske fiskere fikk. Årsaken til det, slik komiteen så det, var ulikheter i markedstilpasning mellom de to lands fiskerier. Mens norsk fiskerinæring i hovedsak leverte tørrfisk og klippfisk til fattige land i Sør-Europa, Latin-Amerika og Afrika, kunne britiske fiskere nyte godt av kjøpesterke ferskfiskmarkeder i urbane sentra. Men denne fordelen ville bli tilgjengelig også for norske fiskere ved hjelp av moderne fryseteknologi:

> *Kunde man opnå at det fiskespisende publikum i de tettbefolkede land ville forlange frossen fisk og frossen filet, skulde man tro at en ny tid vilde oprinne for våre kystfiskerier. Ti da vilde vi så å si overalt på kysten kunne produsere sådan vare, og Finnmark, som nu ligger uheldigst til, når det gjelder ferskfiskeksport, vilde kunne bli leverandør av kvalitetsvare framfor nogen (sitert fra: Finstad, 2010:162).*

Kjøle- og fryseteknologi var altså løsningen på fiskernes problem. Denne forståelsen av lønnsomhetsproblemet overlevde tredvetallets krisefase og okkupasjonsårenes økonomiske oppgangstid, og kom til å danne grunnlaget for moderniseringsprosjektet i Nord-Norge i etterkrigstida. I forbindelse med gjenoppbyggingen av landet etter 1945 fikk analysen ekstra tyngde, og prosjektets mandat ble utvidet. Den samfunnsmessige oppgaven skulle ikke bare være å løse "fiskernes prisproblem", men å bringe den nordlige landsdelen inn i en industriell æra. De to målene kunne oppnås under ett. Fiskerienes grunnleggende lønnsomhetsproblem var av samme art som landsdelens. I nasjonalbudsjettet for 1947 heter det at det må legges vekt på "å bygge ut de næringer som gir størst utbytte av arbeidskraften", nemlig industrien (St. meld. nr. 10, 1947: 15). Målene om økt levestandard for befolkningen kunne bare skje ved produktivitetsøkning. Dette skulle oppnås ved å flytte arbeidskraft fra sektorer med lav produktivitet til sektorer med høy. Fiskeriene nevnes eksplisitt som en lavproduktiv næring, og i nasjonalbudsjettet ble det uttrykt en målsetting om å redusere antallet fiskere fra 115.000 til 40.000 (Aegisson, 1993:107). Satsingen på å bygge en moderne filetindustri var del av en større plan om økonomisk strukturendring i landsdelen (Hersoug & Leonardsen, 1979).

Under Quisling-regjeringen var planarbeidet ved Fiskeridirektoratet i Bergen blitt intensivert. Allerede i 1943 forelå en komplett plan for utbygging av en moderne eksportorientert fiskeindustri etter krigens slutt. Dette arbeidet, som videreførte tankegodset fra Kjøle- og Fryserikomiteen ti år tidligere, ble smuglet ut av landet og kom til å danne grunnlaget for London-planens fiskeridel som eksilregjeringen utarbeidet høsten 1944 (Finstad, 2010). Framtiden for fiskeriene, og nøkkelen til å løfte Nord-Norge ut av fattigdom, var en offentlig finansiert filetindustri beskyttet av et eksportmonopol. På grunn av den relative stabilitet og jevnhet i råstofftilførselen ble Finnmark vurdert som det beste lokaliseringsområdet. Utbyggingen startet for fullt fra begynnelsen av 1950-tallet, etter at Stortinget hadde vedtatt hovedtrekkene i forslagene fra det såkalte Landsplanutvalget i 1948: Innstilling om reisning av allsidige fiskeforedlingsanlegg i Finnmark og Nord-Troms. Da var allerede en annen del av planen blitt iverksatt, ved at Frionor hadde fått enerett på eksport av fryst filet fra 1946.

I løpet av det neste tiåret ble hovedtrekkene i industriplanen realisert, om enn med noen variasjoner i forhold til den opprinnelige modellen. Tre konserner ble dominerende. Det ene var A/S Finnmark og Nord-Troms fiskeindustri (Finotro). Konsernet var et ektefødt barn av Landsplanutvalget, som opprinnelig hadde foreslått oppføring av tolv Finotro-fabrikker fra Skjervøy i Nord-Troms til Vadsø i Øst-Finnmark. Av ulike grunner, ble det bare bygget sju anlegg. Konsernet stod ferdig i 1956, med fabrikker på Skjervøy, Honningsvåg, Kjøllefjord, Mehamn, Berlevåg, Båtsfjord og Vardø. Hovedvirksomheten var fryst filet i blokk, men det ble også drevet konvensjonell produksjon ved anleggene. Staten var majoritetseier med 98 prosent av aksjene, mens de øvrige aksjene var eid av Norges Råfisklag, Norges Fiskarlag og LO. I utgangspunktet var råstoffleveransene til Finotro basert på kystflåten, og i det fiskerdominerte konsernstyret var trålermotstanden sterk og uttalt (Finstad, 2005). På grunn av stor overkapasitet og vansker med råstofftilførselen, slet selskapet hele tiden med økonomien og måtte stadig tilføres ny kapital fra staten. Etter hvert måtte

trålermotstanderne gi opp kampen, og fra 1970 ble Finotro eiere av en rekke trålere som ble knyttet til anleggene. En viktig årsak til dette var kravet fra fiskeindustriarbeiderne som var misfornøyde med kystflåtens manglende evne til å levere tilstrekkelig med råstoff, med produksjonsstopp og avsigelser som resultat.

Findus ble etablert i Hammerfest i 1951, og kom til å bli den største enkeltaktøren i norsk hvitfiskindustri. Selv om Findus og Finotro hadde sentrale likhetstrekk, var de også motstykker. Mens Finotro var statseid, var Findus et rent privat aksjeselskap, eid av sjokoladeprodusenten Freia i Oslo. Senere, i 1962, ble selskapet overtatt av Nestlé, et internasjonalt storkonsern med hovedsete i Sveits. Videre hadde konsernene forskjellige distribusjonskanaler. Mens Finotro var en del av Frionorsamarbeidet, markedsførte Findus sine fiskeprodukter under eget varemerke. For at dette skulle være mulig innenfor det norske eksportregimet for fisk, hadde bedriften allerede fra starten av fått godkjenning som eksportør av fryst filet, ved siden av Frionor. En tredje forskjell gjaldt tilførsel av fiskeråstoff. Mens Finotro var basert på innkjøpt råstoff fra kystflåten, fikk Findus sine første trålere allerede i 1956. På dette tidspunkt var eiendomsretten til fiskefartøyer forbeholdt fiskere, og loven ga ikke anledning til at et industriselskap som Findus selv kunne eie fiskefartøyer. Men selskapet omgikk dette – med myndighetenes stilltiende samtykke – ved at aktive fiskere i navnet stod som eiere av Findus' trålere (Lien, 1975; Jacobsen, 1996). Senere ble bestemmelsene myket opp. Dels for å rydde vei for moderniseringsprosjektet, og dels som svar på den økende aktiviteten av den utenlandske trålerflåten i norske farvann, ble det gitt dispensasjon fra loven om fiskernes eiendomsrett til fartøyer i takt med utbyggingen av filetindustrien. Den restriktive Trålerloven av 1939, som hadde satt en øvre grense for antall norske trålere til elleve, ble også myket opp (Christensen, 1991; Jensen, 2010:137ff). Til tross for sterke protester fra kystfiskerhold ble det gjennom disse grepene lagt til rette for oppbygging av en norsk trålerflåte (Aegisson, 1993).

I tillegg til Finotro og Findus var det et tredje konsern som etablerte seg som filetprodusent i Finnmark i den første etterkrigstiden. Ålesundsfirmaet Brødrene Aarsæther hadde drevet et konvensjonelt fiskebruk i Kjøllefjord allerede i 1910. I 1949 etablerte firmaet seg med moderne produksjon i Båtsfjord, og ble etter hvert en betydelig aktør i nordnorsk fiskeindustri, med anlegg i Kjøllefjord, Båtsfjord, Vardø og Vadsø i Finnmark (Adriansen, 1998).

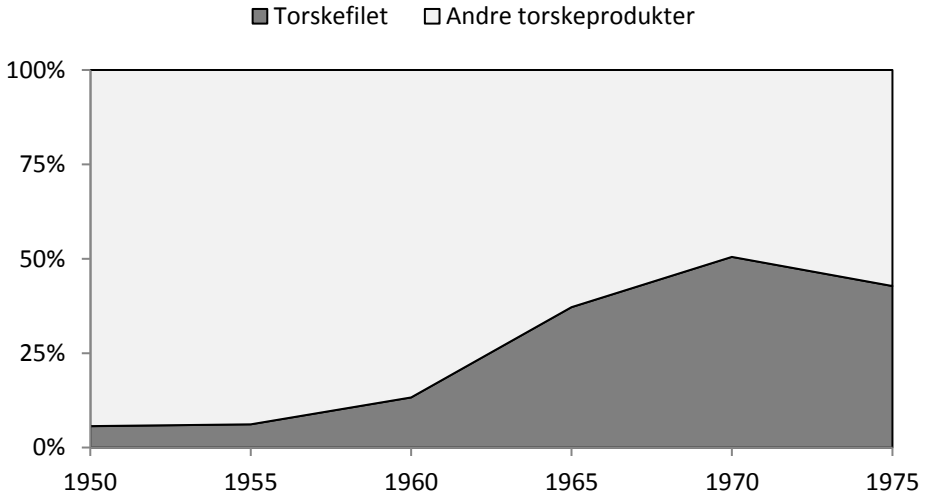
Produksjonen av tørrfisk, saltfisk og klippfisk stod fortsatt sterk langt inn i femtiårene, til tross for oppfatningen om at framtiden lå i filetproduksjon og distribusjon av frosne produkter. En grunn til dette var de sterke sesongsvingningene i torskefiskeriene. For å ta unna sesongtoppene, var det greit å ty til de konvensjonelle produksjonsformene salting og tørking, som var tilpasset dette mønsteret. Finotro, et av de viktigste instrumentene for modernisering av fiskeriene og landsdelen, bygde også opp en svær kapasitet for produksjon av tørrfisk og saltfisk (Finstad, 2005). Bakgrunnen var markedsutviklingen. Stikk i strid med forventningene var det tørrfisk til Afrika som holdt seg best i pris, og ikke filet til Vest-Europa og USA (Johannessen, 1979). Det vil føre for langt å komme inn på alle årsakene her, men det er åpenbart at svært mange konkurrerende fiskerinasjoner i Nord-Atlanteren gjorde som Norge og satset tungt på å etablere en frossenfiskindustri etter krigen (se for eksempel Wright, 2001).

Kampen om torskeråstoffet i nord hardnet tidlig til i gjenreisningsfasen. Allerede før Finotro og Findus hadde produsert et eneste kilo frossen filet, var den konvensjonelle mottakskapasiteten i Finnmark større enn før krigen (Finstad, 2005: 91 ff). Overkapasiteten vakte bekymring, og et utvalg ledet av sentralbanksjef Erik Brofoss slo i 1957 fast at eksisterende fiskeindustrianlegg bare utnyttet halvparten av produksjonskapasiteten (Torskefiskeutvalget,

1957). Konklusjonen var at fabrikkene trengte mer råstoff, ikke økt kapasitet. Likevel kom 1960-tallet til å bli frossenfiskindustriens mest ekspansive periode. Andelen av fryst fisk (av all hvitfisk) fra Finnmark økte fra 18 til 76 prosent og antall anlegg ble tredoblet. Til dels skyldtes dette svikt i omsetning av konvensjonelle produkter, særlig på grunn av borgerkrigen i Nigeria i Vest-Afrika fra 1967, som var det viktigste enkeltmarked for tørrfisk fra Finnmark (Tande & Tande, 1986).

En viktig grunn til kapasitetsveksten i filetindustrien i 1960-årene var de generøse statlige støtteordningene. Frossenfiskindustrien fikk støtte til investeringer, støtte til dekning av kapitalkostnader og sterkere subsidiert råstoff enn andre produksjonsformer. På dette tidspunktet hadde filetsektoren allerede i mange år nytt godt av økonomisk støtte, i første rekke fra det såkalte "Prisreguleringsfondet for fisk". Fondet var opprettet i 1942 som et ekstraordinært tiltak under krigen. Det fungerte slik at myndighetene trakk inn deler av eksportoverskuddet til fondet, som så i sin tur ble brukt til å jevne ut eksportprisene mellom de forskjellige produktene. I praksis fungerte fondet slik at tørrfiskeksporten subsidierte frossenfiskutførselen (Finstad, 2005:157). I 1957 var fondet tomt, og da ble støtteordningene istedenfor lagt på førstehåndsleddet, en ordning som peker framover mot Hovedavtalen for norsk fiskerinæring av 1964. Hovedavtalen ble finansiert direkte over statsbudsjettet, og hadde til hensikt å sikre fiskernes inntekter, men også bidra til omstilling i fiskeindustrien. Mesteparten av avtalemidlene gikk imidlertid til subsidiering av råstoff, differensiert etter anvendelse – og frossenfiskindustien fikk brorparten (Aegisson, 1993; Holm, 1991).

Som Figur 1 viser, var eksporten av frossen filet i vekst fra siste del av 1950-årene. Den største veksten skjedde likevel på 1960-tallet, som følge av nyinvesteringer og rasjonalisering av driften både i de eksisterende anleggene, men også som følge av nyetableringer. Ved siden av de tre konsernene Findus, Finotro og Brødrene Aarsæther, kom andre aktører til. Også enkelte fiskarsamvirkelag startet med filetproduksjon, for eksempel Kiberg Produksjonslag i 1964 (Finstad, 2007: 394). Med denne veksten som utgangspunkt er det et slående trekk at de konvensjonelle produktene utgjorde en så stor del av den totale eksportverdien så lenge. Figuren bekrefter dermed det som er antydet tidligere: Markedsforholdene for frossenfisk kan ikke forklare den massive etableringen av fryserier i de første tjue årene etter 1945.



Figur 1 Andel av eksportverdi for torsk fordelt på produktkategorier 1950 til 1975. "Filet" inkluderer alle produkter av fryst og fersk filet. "Andre torskeprodukter" omfatter eksportverdien av alle andre produkter av torsk. (Kilde: SSBs statistikk for utenrikshandel for respektive år)

Som Figur 1 viser, lyktes industrialiseringsprosjektet, i hvert fall i praktisk forstand: Det ble etablert en industriell virksomhet langs kysten som produserte og eksporterte filet basert på de rike fiskeressursene i Barentshavet. Visjonene til Kjøle- og fryserikomiteen, oppdatert og konkretisert i Londonplanen, var dermed satt ut i livet. I tråd med moderniseringsstrategiplanen var Finnmark etablert som hovedsete for denne filetindustrien. Selv om det var betydelige produksjonsbedrifter også i Troms og Nordland var det i Finnmark at hovedtyngden av produksjonen av torskefilet foregikk. Om lag halvparten av fryst eksportert torskefilet ble i 1973 produsert i Finnmark. Fiskerinæringen, som i utgangspunktet var dominerende i privat sektor i Finnmark, ble med filetindustrien også den viktigste for industrisysselsettingen. I 1970 var 76 prosent av alle industriarbeidsplasser i Finnmark knyttet til næringsmiddelindustri. I samme år var tilsvarende tall for hele landet 12 prosent, og henholdsvis 41 prosent og 21 prosent for Troms og Nordland. Den norske filetsektoren bestod av nærmere 100 fabrikker i storhetstiden på 1970-tallet (Sogn-Grundvåg *et al.,* 2008).

Filetindustrien i Nord-Norge ble bygd opp som ledd i en ambisiøs strategi for gjenreisning og modernisering av landsdelen. Som vi har sett ble store ressurser av ulike slag mobilisert i denne prosessen. For det *første* gjaldt dette økonomiske ressurser, i form av kapitalsubsidier, kredittilgang, prisstøtte og skattefritak. Det foreligger ingen beregning av hvor mye dette samlet sett beløpte seg til. At det er snakk om en storstilt offentlig finansiert økonomisk satsing er det likevel ingen tvil om. For det *andre* gjaldt det støtte i form av lovgivning, og da særlig justering av lover som stod i vegen for industrialiseringsprosjektet. De viktigste endringene var reguleringen av fiskeeksporten, og tilpasningen av lovverket for å gi industriselskapene muligheter til å skaffe seg trålere. For det *tredje* må den politiske støtten prosjektet hadde i sentrale politiske institusjoner framheves. Moderniseringen av landsdelen ved hjelp av industrireisning var et sentralt strategisk prosjekt, med bred støtte i Storting og Regjering. Dette kommer direkte til uttrykk i en hel serie av offentlige utredninger og plandokumenter, fra Kjøle og Frysekomiteens innstilling (1932), via London-planen (1944, se Finstad, 2005:70) og Nord-Norgeplanen (St. meld. nr. 85,1951), til Torskefiskeutvalgets innstilling (1957) og Langtidsplanen for fiskerinæringen (St. meld. nr. 18, 1977–78). Det kommer også til uttrykk i de mange enkeltbeslutninger til støtte for saken, som for eksempel stortingsvedtaket om etablering av Finotro, konsesjonsspørsmålene knyttet til Findus, forhandlingene i forbindelse med at Nestlé kjøpte opp Findus i 1962, Stortingets mange intervensjoner i forbindelse med revisjon av fiskerilovgivningen, og de årlige støtteforhandlinger under Hovedavtalen, etc. I denne sammenhengen er det nærliggende å trekke fram rollen til den sosialøkonomiske eliten, og hvordan de nasjonale strateger (Slagstad, 1998) med særlig tyngde i Arbeiderpartiets indre krets (Finstad 2010; Jacobsen, 1996) aktivt sluttet opp om og trakk i tråder til støtte for moderniseringsprosjektet. Dette må likevel ikke etterlate inntrykket av en skjult agenda, at industrialiseringen av torskefiskeriene var drevet fram av en liten krets av modernister og teknokrater i sør, på tvers av en bred folkelig motstand i nord. Tvert om, i denne saken var elite og massene i stor grad på samme linje, og det korporative moderniseringsprosjektet hadde solid støtte og legitimitet på tvers av partier, organisasjoner og institusjoner.

Når dette framheves her er det fordi denne brede forankring har kommet noe i bakgrunnen i den akademiske framstilling, der industrialiseringsprosjektet i stor grad er blitt framstilt som en politisk kamp mellom en elite, modernistene i Arbeiderpartiet, og de brede lag i kystbygder og fiskevær (Brox, 1966; Brox, 1984; Lien, 1975; Hersoug & Leonardsen, 1979; Nilsen, 2002). Den samme grunnfortolkning, bare med motsatt fortegn, har blitt fremmet av andre, enten de har mest sans for de na-

sjonale strateger (Jacobsen, 1996) eller vestlendingenes pågangsmot på sjø og land (Vea, 2009).

Hovedpoenget for oss er selvsagt ikke å nedtone moderniseringsprosjektets grunnleggende politiske karakter. Som det framheves i det foregående, var prosjektet imponerende ambisiøst og krevde storstilt mobilisering av mange typer ressurser, inkludert politisk maktanvendelse. Det er vanskelig å tenke seg at et prosjekt med slike dimensjoner kunne gjennomføres uten politiske konfrontasjoner. Det er disse konfrontasjonene som dyrkes og utdypes i den dypt splittede akademiske fortelling om hva som skjedde i Nord-Norge. Industrireisningens politiske dramaturgi leder lett oppmerksomheten mot strid og ideologisk konfrontasjon. I denne sammenhengen er det imidlertid viktig å understreke prosjektets brede politiske, institusjonelle og samfunnsmessige forankring. Den beste illustrasjonen av dette er Finotro. Sammen med Findus er konsernet kanskje det viktigste enkeltstående uttrykket for industrialiseringsstrategien og moderniseringspolitikken i fiskeriene i etterkrigstida. Samtidig var Finotro et kompromiss, utformet for å passe inn i en næring dominert av kystfisker–interesser med sterke institusjonelle og politiske forskansninger. I Finstads (2005) analyse av Finotro er det nettopp konsernets balansegang mellom de motstående hensyn som kommer til uttrykk. Selv om filetproduksjonen var kjernen i konsernets virksomhet, engasjerte det seg også i produksjon av konvensjonelle produkter. I et brev til fiskeriministeren i 1963 understreket Finotros direktør, Harald Vik, at konsernet hadde uforholdsmessige store kostnader på grunn av dets "noe sosialbetonte karakter" (Finstad, 2005: 176). Finstad knytter dette utsagnet til konsernets praksis med at produksjonen i mange tilfeller ble opprettholdt, selv ved manglende bedriftsøkonomisk lønnsomhet, for å unngå avsigelser og for å opprettholde mottaksfunksjonen for kystflåten. I en styresak fra 1973, heter det således:

> *Styret finner grunn til å gjøre oppmerksom på at FI-NO-TRO prinsipielt ikke bare kan ta hensyn til lønnsomheten (…), men plikter å opprettholde mottaket av fisk fra de fiskerne som ellers i året leverer fisk til anlegget (sitert i Finstad, 2005: 223).*

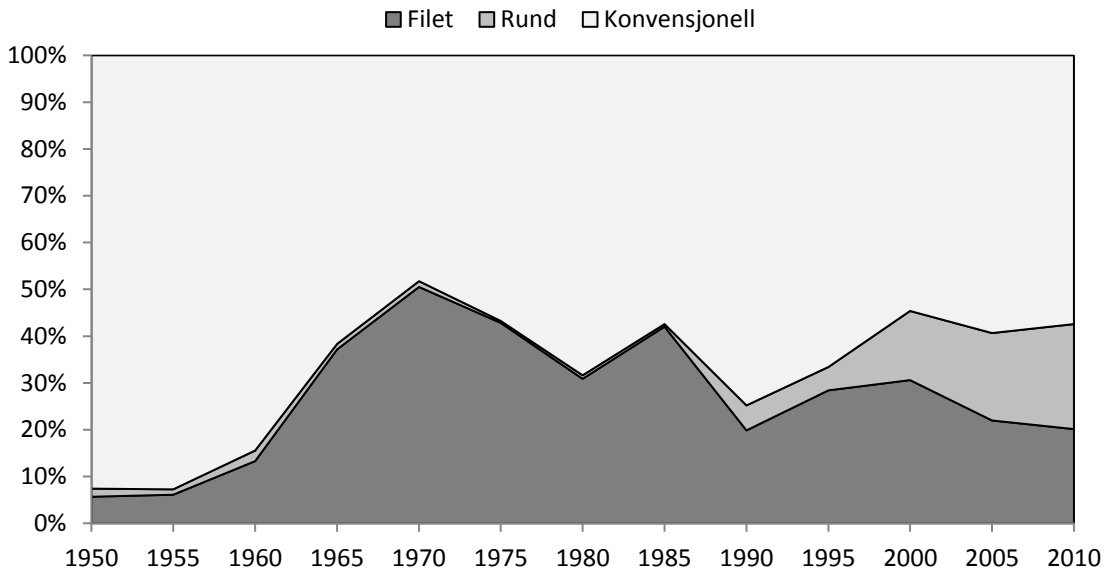
På samme måten som konsernets direktør hadde understreket ti år tidligere, framhever styret her at oppdraget ikke bare var å drive produksjon innenfor bedriftsøkonomisk forsvarlige rammer. Finotro hadde ansvaret for å sørge for gode og helårlige arbeidsplasser i foredling, samt å sørge for gode priser til fiskerne. Som ledd i moderniseringsprosjektet, var oppgaven for Finotro ikke begrenset til å produsere og selge filet på forretningsmessige vilkår, men å bygge en landsdel ved hjelp av moderne produksjonsformer. Det var mer enn som så; konsernet hadde overtatt og gjort til sitt eget det sett av verdier, problemforståelse og løsningsmodeller som lå til grunn for industrireisningen.

Den motsetningsfylte relasjonen til trålerne viser hvordan Finotro favnet hele spennet fra kystfiske og konvensjonelle driftsformer til industriell drift og samlebåndets produksjonslogikk. I utgangspunktet var det ikke forutsatt at Finotro-konsernet trengte egne trålere. Tvert imot, det var ikke i tråd med konsernets samfunnsmessige oppdrag å konkurrere med kystfiskerne, slik en anskaffelse av trålere ville bety. I stedet gjaldt det å sette industrielle metoder og produkter i fiskernes tjeneste, ved å tilby dem gode priser og gunstige leveringsvilkår. De erfaringene konsernet høstet ble reflektert i røde regnskapstall og stadige behov for statstilskudd, men tilgangen på kapital var ikke ubegrenset. Til tross for at kystfiskerinteressene dominerte Finotro-konsernets styrende organer, måtte en til slutt akseptere at det var nødvendig å sikre en mer kontinuerlig tilførsel av råstoff, noe som skjedde i 1970 da selskapet omsider fikk egne trålere (Finstad, 2005: 229 ff).

Finotro var altså et kompromiss, en mellomløsning, som tok hensyn til og bygde bro mellom industrialismens krav og kystfiskernes interesser. I den virkelighet industriprosjektet skulle realiseres, var kystfiskerne allerede godt etablert og beskyttet av lover, organisasjoner og politiske allianser (Holm, 1996). For at prosjektet skulle lykkes, måtte det realiseres på kystfiskernes premisser. Selv om dette er enklest å dokumentere når det gjelder Finotro, gjelder det også generelt for den produksjonsstruktur moderniseringsprosjektet ga opphav til. Ottar Brox' analyse av fiskeindustribedriftene som sosiale institusjoner bekrefter dette:

> *Det mønsteret som vokser fram gjennom denne prosessen, er et system av sterke, teknologisk og organisasjonsmessig konsoliderte bedrifter, vanligvis – men ikke alltid – plassert i de større kommunesentrene. De blir "hjørnesteinsbedrifter" i hver sin region, fylkenes utviklingsavdelinger og DUF spiller rollen som "problemløsere" for dem. (…) Resultatet er i alle fall at bedriftene blir "institusjoner", prinsipielt på samme måte som skoler, sykehus og arbeidskontorer, som heller ikke er avhengig av sine egne driftsresultater for å overleve (Brox, 1984: 185).*

På grunn av det samfunnsmessige ansvaret som ble tillagt foredlingsbedriftene, gikk deres oppdrag langt ut over det å være økonomiske aktører. Resultatet av dette kompromisset var at industrialiseringsprosjektet ble gjennomført, men slett ikke med den kraft og presisjon som industriforkjemperne hadde håpet på. En av konsekvensene var overkapasitet. Den moderne filetindustri kom ikke til erstatning for konvensjonell produksjon, men i tillegg til den. Trålerne kom ikke i stedet for tradisjonelle kystbåter, men ved siden av kystfiskeflåten – som også ble modernisert og oppgradert.



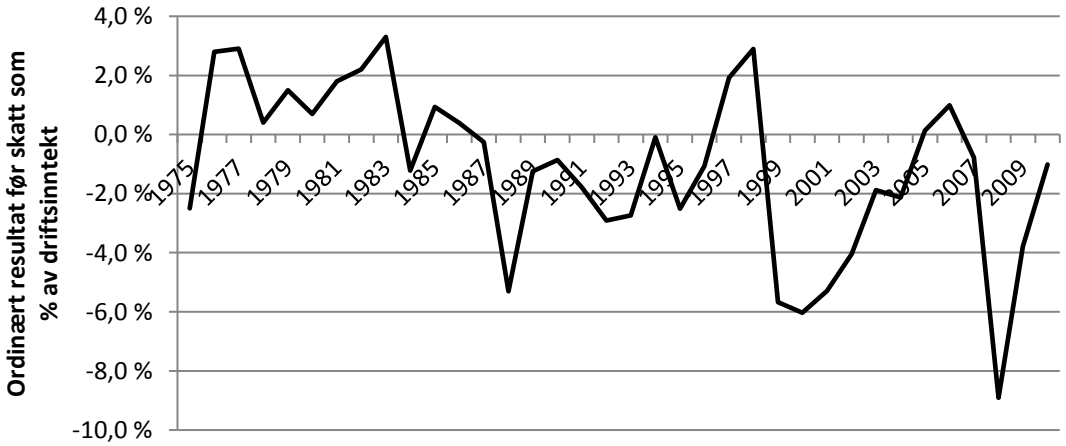
Figur 2 *Andel av eksportverdi for torsk fordelt på produktkategorier 1950 til 2010. "Filet" inkluderer alle produkter av fryst og fersk filet. "Rund" omfatter all frosset og fersk ubearbeidet torsk. "Konvensjonell" er alle produkter av tørrfisk, klippfisk og saltfisk. (Kilde: SSBs statistikk for utenrikshandel for respektive år)*

Stagnasjon og forvitring

Etter den sterke oppbygging fram til slutten av 60-tallet har norsk filetindustri stagnert og langsomt forvitret. En side ved dette illustreres av Figur 2, som viser hvordan torskefilet over tid har fått mindre betydning som eksportprodukt. I begynnelsen av 1970-tallet utgjorde filet halvparten av eksportverdien av torskeprodukter. I 2010 hadde andelen sunket til 20 prosent. Dette betyr likevel ikke at de konvensjonelle produksjonsformene, tørrfisk, saltfisk og klippfisk, har vunnet tilbake alt tapt terreng etter filetindustriens ekspansjon på 1960-tallet. Eksporten av rund torsk (fersk og fryst) vokst, særlig etter 1995. I 2010 var eksportverdien av ubearbeidet (rund fersk og fryst) torsk større enn verdien av filet. Som vi ser av figuren har nedgangen gått i rykk og napp. En grunn til dette er de såkalte "tørrfiskkriser", der sammenbrudd i "Nigeriamarkedet" har gitt mulighet for kortvarig oppgang i filetproduksjonen (se for eksempel Aegisson, 1993:235). En annen faktor er de russiske tråleres landinger av stor mengder fersk fisk til filetindustrien på 1990-tallet, som i en periode lettet situasjonen for filetbedriftene (Henriksen, 2009). I det lange løp er det likevel den nedadgående trenden som dominerer bildet. Nedgangen i fileteksporten de siste 40 årene tilsvares av en sterkere reduksjon i antall filetbedrifter og sysselsatte i filetproduksjon. Mens det på begynnelsen av 1970 var om lag 100 filetbedrifter, var det i 2010 bare 10 tilbake. Fra 1980 til 2010 har antall sysselsatte i filetindustrien på landsbasis blitt redusert fra ca. 3.950 til ca. 720 (Bendiksen, pers. med.).

Svak og synkende lønnsomhet i filetindustrien er en viktig forklaring på at sektoren forvitrer. Dette framgår av Figur 3, som viser utviklingen av ordinært resultat (før skatt) i filetbedriftene i perioden 1975 til 2010. I perioden 1987 til 2010, har bedriftene kun rapportert om tre år med positivt resultat.

Det er sammensatte forklaringer til filetindustriens svake lønnsomhet. Resultatene vi ser kan forklares med samvirket mellom internasjonale konkurranseforhold og nasjonale rammebetingelser. Arbo & Hersoug (1997), som tok for seg konsekvensene av globaliseringsprosessen for fiskeindustrien i Finnmark fram til midten av 1990-tallet, framhevet særlig tre drivkrefter. Det var introduksjonen av ny teknologi innen fangst, produksjon og transport, framvekst av store internasjonale selskaper med globale strategier for anskaffelse av råstoff og salg av produkter og liberaliseringen av verdenshandelen.



Figur 3 Utviklingen i lønnsomhet i filetsektoren som helhet fra 1975 til 2010 (Kilde: Driftsundersøkelsen, Nofima)

Norge var ikke den eneste nord-atlantiske nasjonen som bygde opp filetindustrien etter krigen. Blant annet Island, Færøyene, Storbritannia, Tyskland og Canada bygde samme type industri i samme tidsrom som Norge (Wright, 2001) Det er nærliggende å tro at oppbyggingen var basert på samme antakelse som i Norge, at filet fra torsk og annen hvitfisk var en fremtidsrettet løsning. Dette førte imidlertid til prispress på filetprodukter og er en medvirkende årsak til bedre pris for konvensjonelle produkter så vel som filetindustriens lønnsomhetsproblemer.

Globaliseringen førte etter hvert også til oppbygging av moderne foredlingsindustri rundt om i verden. og til at fryste hvitfiskprodukter fra Nord-Atlanteren har møtt stadig sterkere konkurranse fra nye arter og nye leverandører i sine tradisjonelle markeder. Sammenbruddet i Sovjetunionen medførte i tillegg at store mengder hvitfisk som tidligere gikk til konsum i østblokklandene også havnet på markedene. Ut over 90-tallet ble Kinas offensive strategi som konsumvareprodusent stadig mer tydelig. Landet ble en betydelig produsent av fryste konsumvarer av hvitfisk. Forutsetningen for denne strategien har vært billig frakt. Fryst råstoff fra hele verden, også Nord-Norge, har gjennom effektive og billige logistikksystemer funnet veien til Kina og tilbake til markedene.

En av globaliseringens viktigste konsekvenser for norsk filetindustri er altså en sterk og direkte konkurranse om råstoffet. Et uttrykk for dette framkommer i Figur 2 ved den sterke økningen av "rund" fisk, det vil si ubearbeidet og i all hovedsak fryst fisk. De siste 20 årene har torsken i Barentshavet i økende grad blitt kanalisert direkte inn i et globalt råstoffmarked, uten å ta veien om foredlingsbedriftene langs norskekysten. Her er vi altså fremme ved den strukturelle forklaringen på det paradokset vi startet med, kontrasten mellom eventyrfiske i et hav som koker av fisk og livløsheten i fiskemottakene på land. Det skyldes nettopp at konkurransen om råstoffet og spesielt det fryste har blitt skjerpet fra norske klippfiskprodusenter og filetprodusenter i Kina og på Baltikum. Nærheten til fiskefeltene, selve grunnlaget for bosetting og samfunnsutvikling på norskekysten, er ikke lenger et komparativt fortrinn.

Framveksten av et globalt råstoffmarked kan avleses direkte i prisdannelsen i førstehåndsmarkedet. Som Tabell 1 viser er prisforskjellene jevnt over vesentlig høyere for fryst råstoff enn for fersk og andelen fersk råstoff i trålernes landinger er fallende.

Grunnlaget for at trålerne oppnår høyere pris for fryst enn fersk fisk er nettopp globaliseringsprosessen. Mens fryst fisk kan omsettes globalt, er markedet for fersk fisk begrenset i tid og rom. Samtidig er de norske filetprodusenter stadig avhengige av ferske leveranser. Fryst råstoff gir ikke grunnlag for lønnsom filetproduksjon i Norge (Sogn-Grundvåg *et al.,* 2008). Den paradoksale situasjonen har dermed oppstått ved at trålerne, som i sin tid fikk innpass i norske fiskerier nettopp for å forsyne filetindustrien med råstoff, i økende grad eksporterer råfisken direkte i frossen form. Filetbedriftene har på sin side blitt avhengige av leveranser fra kystflåten, som ikke har samme mulighet for ombordfrysing. Selv om denne flåten er strukturert og modernisert, eksisterer sesongpreget i leveransene som før (Henriksen, 2011).

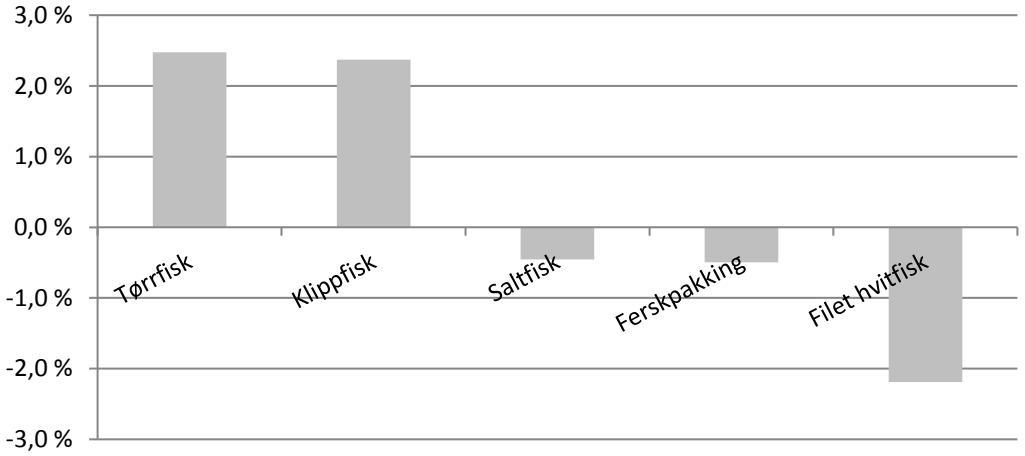
De strukturelle endringer i råstoffmarkedet har satt de norske filetbedriftene i en særlig vanskelig posisjon. Dette forsterkes ved særegenheter ved det norske arbeidsmarkedet, som i lang tid har vært preget av lavere ledighet og høyer arbeidskraftkostnader enn våre handelspartnere og konkurrentland (TBU, 2012). Innenfor den generelle økonomiske politikken, som har ligget til grunn for produktivitets- og velstandsutviklingen i Norge som nasjon, er det en forutsetning at sektorer med lav lønnsomhet skal avgi arbeidskraft til mer produktive sektorer (Moene, 2003). Innenfor disse rammene har filetindustrien åpenbare vanskeligheter med å konkurrere om dyr norsk arbeidskraft. Dette kan blant annet avleses ved det økende innslag av

utenlandsk arbeidskraft på korttidsopphold i filetindustrien (Henriksen & Bendiksen, 2008).

Den norske filetindustriens vansker oppstår ikke bare i forhold til konkurransen med filetprodusenter i andre land, men også i forhold til andre produksjonsformer nasjonalt. Det er mye som tyder på at konvensjonell produksjon (tørrfisk, saltfisk og klippfisk) er mindre sensitiv både for sesongmønstre og kvalitetsvariasjoner enn filetproduksjon (Henriksen, 2011). Selv om lønnsomheten i norsk fiskeindustri generelt er svak, gjør filetbedriftene det jevnt over dårligere enn de som har satset på konvensjonelle produksjonsformer. Dette framgår av Figur 4, som viser ordinært resultat (før skatt) som andel av driftsinntekter fordelt på produksjonsform for perioden 1993–2010. Mens det er positiv lønnsomhet i produksjon av tørrfisk og klippfisk, er tallene negative for filet. Dette bekrefter også mønsteret som framgår i Tabell 1, og underbygger at filetprodusentene ikke har økonomisk grunnlag for å bruke pris som virkemiddel for å øke leveransene fra kystflåten når råstofftilgangen fra trålerne svikter.

Tabell 1 Gjennomsnittlig førstehåndspris i kr/kg rundvekt på torsk og hyse, og andel fersk torsk og hyse levert fra norske trålere fordelt på fersk og fryst (Kilde: Fiskeridirektoratets sluttseddeldatabase)

	2005	*2006*	*2007*	*2008*	*2009*	*2010*
Fersk torsk	12,19	12,97	14,01	15,24	10,70	9,36
Fryst torsk	13,43	16,42	18,21	14,89	10,42	12,10
Andel fersk torsk	31,1 %	23,9 %	24,1 %	22,3 %	8,8 %	16,6 %
Fersk hyse	7,07	7,23	7,55	7,27	5,70	5,69
Fryst hyse	9,41	12,29	12,93	8,49	7,77	8,85
Andel fersk hyse	27,1 %	15,9 %	16,4 %	16,5 %	3,3 %	7,0 %



Figur 4 Ordinært resultat før skatt som andel av driftsinntekter fordelt på produksjonsform, gjennomsnitt for perioden 1993–2010 i norsk fiskeindustri (Kilde: Driftsundersøkelsen for fiskeindustrien, Nofima)

Institusjonelle tilpasninger for en global fiskevarehandel

Norske filetbedrifter har vanskelig for å hevde seg i det globale fiskevaremarkedet. Problemet er så stort og åpenbart at en kanskje kan snu problemstillingen på hodet: Mysteriet er ikke at filetanleggene sliter – selv om havet koker av fisk – men at det i det hele tatt er liv i dem. Hvorfor har ikke næringsaktører og myndigheter for lengst tatt inn over seg de økonomiske realitetene og justert kapasiteten til et mer realistisk nivå? Hvorfor ropes det om krise, som om vanskene kom uventet som lyn fra klar himmel, når konkurser og nedbygging er forventet og ledd i en nødvendig strukturell tilpasning?

Dette bringer oss til spørsmålet om hva slags krise fiskeindustrien egentlig befinner seg i. Kanskje betyr ikke serien av innskrenkninger og konkurser i filetindustrien annet enn at nedbyggingsprosessen har gått langsomt. Inntrykket som er skapt av endeløs repetisjon og onde sirkler trenger dermed ikke være uttrykk for en dypere krise, men er mer uttrykk for en overdramatisert fortolkning av en lang serie lokale omstillingsepisoder. Som alle vet vil konkurser og tap av arbeidsplasser gjerne tiltrekke seg betydelig medieoppmerksomhet og politiske besvergelser uten at dette nødvendigvis reflekterer sakens økonomiske betydning og gjennomslagskraft i realpolitisk sammenheng. Det hører således med til historien at fiskerisektorens økende eksponering for internasjonale konkurransebetingelser også henger sammen med institusjonelle tilpasninger i Norge. Til en viss grad kan en si at de strukturelle endringene i filetsektoren er lagt til rette for og sanksjonert ved en serie reformprosesser og lovendringer i Norge. Vi skal se på to viktige eksempler, nedbygging av statsstøtten til fiskerisektoren og endringene av rammebetingelsene i råfiskmarkedet.

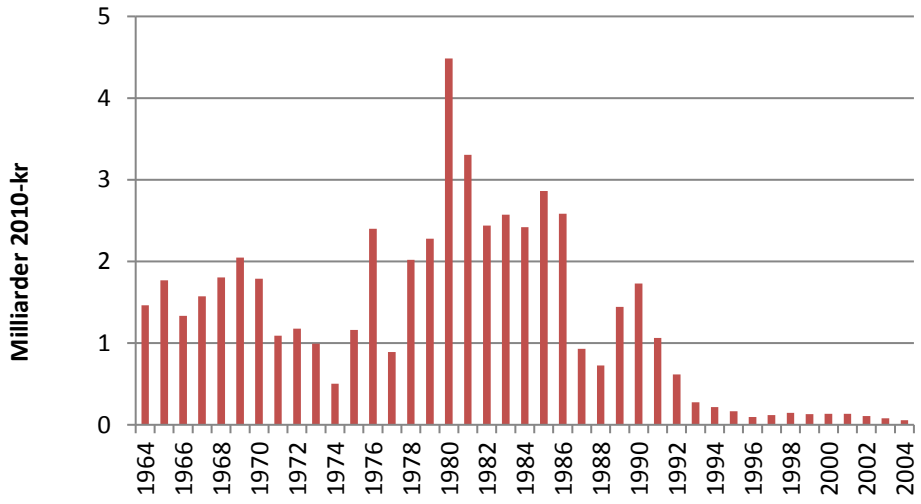
Avvikling av Hovedavtalen

Slik vi har sett ble filetindustrien bygd opp som ledd i et ambisiøst moderniseringsprosjekt, der mange former for myndighetsintervensjon kom til anvendelse, inkludert økonomiske subsidier. Når filetbedriftene kunne innta rollen som "institusjoner" som i likhet med skoler og sykehus ikke kunne gå konkurs (Brox, 1984), var det nettopp fordi de kunne skjermes fra lønnsomhetskrav og konkurranse ved hjelp av subsidier. Selv om støtten til filetsektoren hadde sin særegne begrunnelse i lys av den relativt lave utviklingsgraden i nordnorsk næringsliv, må de også sees i sammenheng med en generøs subsidiering av fiskerisektoren generelt. Svake resultater i fiskerinæringen og en målsetting om å sikre at fiskeribefolkningen holdt tritt med lønnsutviklingen i industrien medførte økende statsstøtte til fiskerinæringen fra slutten av 50-tallet. Fra 1964 ble det etablert en hovedavtale for fiskeriene, med staten og Norges Fiskarlag som avtalepartnere. Selv om fiskernes interesseorganisasjon ble utpekt som statens forhandlingsmotpart og størstedelen av subsidiene ble utbetalt i fangstleddet, var avtalen både formelt og i praksis innrettet for å sikre høyt og stabile inntektsforhold for sektoren som helhet (Holm, 1991).

Hovedavtalen er det nærmeste vi kommer en formell samfunnskontrakt for fiskerisektoren. I følge avtalen var subsidiene dimensjonert for å kompensere for svingninger i ressurstilgang og markedsforhold. Hensynet bak var å sikre stabil og god lønnsomhet i alle næringsledd, slik at fiskerisektoren kunne bidra til å opprettholde sysselsetting og bosetting på kysten (Holm, 1991). Dette var igjen koplet direkte til forhandlingssystemet i råfiskmarkedet, regulert i Råfiskloven og med minstepriser som et viktig instrument. Med Hovedavtalen var det altså etablert en direkte forbindelse mellom sektorens økonomiske tilstand og de overordnede samfunnsmessige målsettinger. At staten hadde forpliktet seg til å yte økonomisk støtte ble direkte begrunnet med utgangspunkt i fiskerienes rolle som

samfunnsbærende sektor på kysten (Hallenstvedt, 1982; Holm, 1991).

Figur 5 viser statsstøtten til fiskerisektoren, i faste kroner, gitt over Hovedavtalen fra 1964 til 2004, da den formelt ble sagt opp av Stortinget. Figuren bekrefter en massiv offentlig støtte på 60-tallet. Subsidiene var imidlertid høyest i faste 2010-kroner på 80-tallet, som en reaksjon på reduserte kvoter og svikt i viktige markeder. Etter toppen i 1980, ser vi en gradvis nedbygging av subsidiene, med en et lite intermesso på 1990-tallet på grunn av tilstanden i torskebestanden. En viktig bakgrunn for denne reduksjonen er etableringen av det nye havrettsregimet og etableringen av 200 mils økonomiske soner fra 1977. Innenfor det gamle havrettsregimet, med åpen adgang og hard internasjonal konkurranse om fiskeressursene i Barentshavet, var det uten tvil rasjonelt, sett fra norsk side, å subsidiere fiskeriene. Hensikten var å øke effektiviteten og den samlede kapasiteten i norsk fiskerinæring, slik at større andeler av fisken i internasjonale farvann kunne fanges av norske fiskere og bearbeides i norske industrianlegg. At andre fiskerinasjoner satset på samme strategi og dermed skapte en samlet overkapasitet og etter hvert desimerte bestander, er en annen sak. Dette er et viktig eksempel på "allmenningens tragedie" (Hardin, 1968) og var en av de sentrale faktorene bak etableringen av det nye havrettsregimet (Holm, 2001). Poenget i denne sammenhengen er nettopp at etablering av 200 mils soner ga norske myndigheter, alene eller i samarbeid med andre kyststater, kontroll over ressursene. Ved dette var den økonomiske rasjonaliteten for å fortsette med fiskerisubsidiene radikalt endret. Mens Hovedavtalen før 1977 hadde gitt mening, var den ved det nye havrettsregimet direkte kontraproduktiv. I denne situasjonen vil fiskerisubsidier ikke kunne avhjelpe lønnsomhetsproblemer i næringen, bare forsterke dem ytterligere (Brochmann, 1981; Hannesson, 1978).



Figur 5 Bevilgninger over hovedavtalen til subsidier av norsk fiskerinæring i faste kroner

Selv om regimeendringen som førte til avviklingen av fiskerisubsidiene skjedde i 1977, tok det tid før dette slo inn og ble tatt til følge i fiskerisektoren (Holm, 2001). Mens Hovedavtalen ble kritisert og mistet legitimitet ut over i 1980-årene, var det først ved inngåelser av internasjonale handelsavtaler på begynnelsen av 1990-tallet (EFTA, senere WTO og EØS) at statsstøtten ble bygd ned og Hovedavtalen endelig avviklet.

I denne sammenhengen, der vi er opptatt av interessen for endringen av fiskerienes samfunnskontrakt, er nedbyggingen av

statsstøtten og avviklingen av Hovedavtalen interessant på flere måter. For det *første* innebar det at filetbedriftene, i likhet med de andre aktørene i fiskerinæringen, ble eksponert for lønnsomhetskravet fra internasjonale markeder på en mer direkte og hardhendt måte. Mens de tidligere, i kraft av å være hjørnesteiner, knapt kunne gå konkurs, ble dette nå gradvis en nærliggende og reell mulighet. For det *andre* hadde Hovedavtalen inngått som et element i en større korporativ og proteksjonistisk næringsformasjon der statsstøtten ble legitimert nettopp ut fra fiskerienes samfunnsmessige rolle. Mot at staten tok ansvar for lønnsnivået, skulle fiskerisektoren bidra til å opprettholde bosetting og sysselsetting på kysten. Med bortfallet av Hovedavtalen var dette oppdraget svekket på to måter. Dels rent praktisk ved at fraværet av subsidier og økt vekt på lønnsomhet ville innebære færre og mer effektive enheter. Dels ideologisk ved at de årlige støtteforhandlinger falt bort som offentlig arena. Med dette mistet fiskerisektoren den viktigste diskursive anledning til å forklare og begrunne fiskerienes samfunnsmessige rolle.

Reformer i grenseflaten mellom fangst- og foredlingsledd

Hallenstvedt (1982) har beskrevet organisasjonsmønsteret i norsk fiskerinæring slik det vokste fram med utgangspunkt i krisesituasjonen i mellomkrigstida. Et hovedmønster er en tredelt struktur, der fangst, foredling og eksport har vært organisert hver for seg og i motsetning til hverandre, med separate næringslover og organisasjoner. Dette var en del av et proteksjonistisk mønster som skapte en innadvendt oppmerksomhetsstruktur. Med en spissformulering sier Hallenstvedt at næringen var organisert med "ryggen mot markedene", til tross for at over 90 prosent av fisken gikk til eksport.

Mens en slik næringsstruktur nok hadde sine grunner og ga mening i den tiden den ble etablert, har den gradvis kommet under press, dels som følge av det nye havrettsregimet (Holm, 2001), dels som følge av liberaliseringen av det internasjonale handelsregimet (Arbo & Hersoug, 1997). Selv om mye av det gamle mønsteret stadig er intakt, har det også skjedd viktige endringer. I foregående avsnitt har vi beskrevet endringene i de statlige støtteordninger i fiskeriene. I det følgende skal vi se nærmere på en annen endring, nemlig speilvendingen av Sjøgrenseloven av 1992 (Ot.prp.nr. 611991–92). Dette bidro til en fundamental endring av relasjonene mellom flåte og foredlingsledd, noe som skulle få særlig betydning for filetsektorens posisjon i råfiskmarkedet.

Inntil speilvendingen av sjøgrenseloven i 1992 gjaldt et generelt forbud mot utenlandske landinger av fisk i Norge. Dette forbudet, som det riktignok kunne dispenseres fra ved søknad, hadde sin bakgrunn i en helhetlig strategi for norsk fiskerinæring, der en så flåteledd og landindustri i sammenheng. Rent konkret var forbudet begrunnet i to hensyn. For det *første* var det for "å hindre at utenlandske fiskere oppretter baser på norskekysten". Dette hadde sin opprinnelse under tida med fritt fiske. Etter at Norge etablerte 200 mils økonomiske soner (1977) og dermed fikk kontroll med de viktigste fiskeressursene i norske farvann, ble dette hensynet mindre aktuelt. For det *andre* var formålet med ilandføringsforbudet å sikre stabile og gode pris og avsetningsforhold i førstehåndsomsetning og eksport (Ot.prp.nr. 61,1991–1992). Det er særlig dette punktet, som angår forholdet mellom fangstledd og landindustri, som er relevant i denne sammenhengen. Torskefiskeutvalgets bemerkninger til dette spørsmålet i 1957 er oppklarende:

> *I den offentlige debatt er det i den senere tid reist spørsmål om en bør søke å løse fryserinæringens råstoffproblemer ved å tillate ilandføring av ferskfisk fra utenlandske trålere. Ved vurdering av dette spørsmål må en ta i betraktning at de norske fiskere ikke har disponert en flåte av større båter*

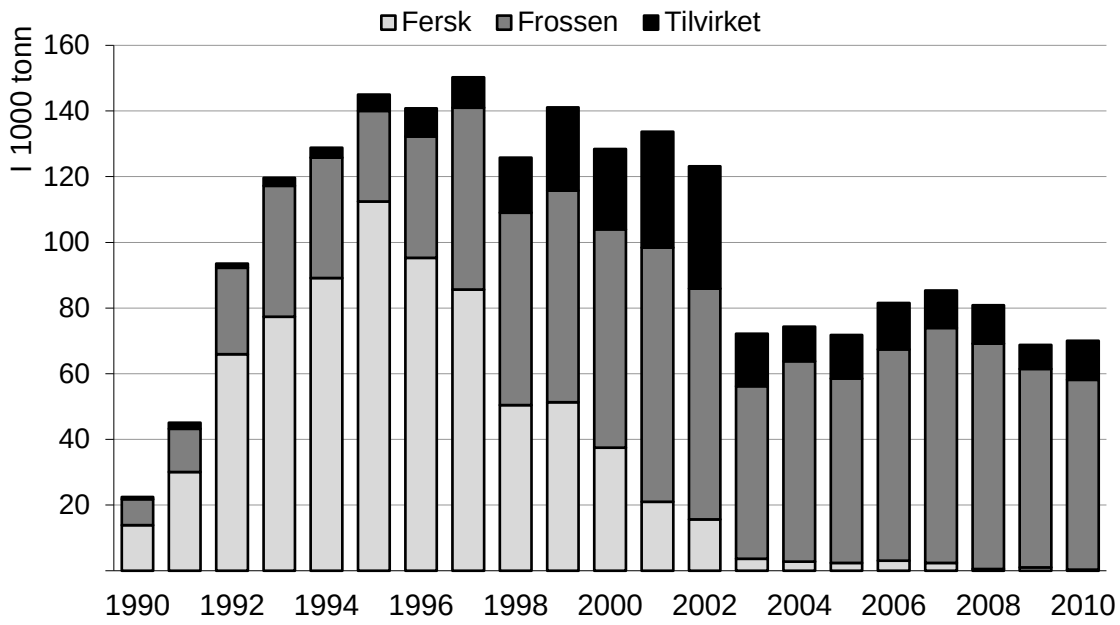
> *som kunne dekke fryserienes råstoffbehov. Går en inn på utvalgets forslag om bygging av fartøyer med særlig sikte på fryserienes behov, synes grunnlaget for de aktuelle forslag om landingsrett for utenlandske trålere å falle bort. (Torskefiskeutvalget 1957: 69)*

Det kompromisset som her skisseres, og som ble lagt til grunn ved oppbyggingen av filetindustrien på 1950 og -60-tallet, innebar en gjensidig forpliktelse mellom fangstledd og landindustri. Mens filetindustrien, sammen med den øvrige fiskeindustri, skulle ta imot fangster og bidra til å sikre fiskerne gode og stabile priser, var det flåtens oppgave – og da særlig trålerne – å sikre råstoffleveransene til fiskeindustrien. Avtalen var balansert og gjensidig forpliktende, slik at fiskerne skaffet råstoffet og industrien foredlet det. Sjøgrenselovens bestemmelse om ilandføringsforbud for utenlandske fartøyer representerte en institusjonalisering av de gjensidige forpliktelser og arbeidsdelingen mellom sektorleddene.

Speilvendingen av Sjøgrenseloven i 1992, der det generelle forbudet mot utenlandske landinger ble erstattet med en generell tillatelse, var en svekkelse av denne næringsmodellen. Det var flere grunner til at speilvendingen ble mulig og skjedde på dette tidspunktet. Foruten at det nye havrettsregimet var på plass, noe som hadde gjort frykten for utenlandske baser på norskekysten mindre aktuell, kom speilvendingen som et av flere elementer i en mer omfattende revisjon av fiskerilovgivningen som hadde sammenheng med den norske EØS-prosessen. Samtidig med at Sjøgrenseloven ble speilvendt, ble Råfiskloven justert. I tillegg ble Tilvirkerloven samt lov om konjunkturreguleringsfond for torskefiskeriene opphevet (Ot.prp.nr. 61, 1991–92). Disse lovendringene må igjen sees i sammenheng med andre endringer, særlig inngåelsen av Frihandelsavtalen i EFTA i 1989 og den nye Fiskeeksportloven i 1990 (Ot.prp.nr. 27,1989–90). Til sammen var dette en omfattende endring av rammebetingelser for fiskeindustrien, og representerte et oppgjør med et gjennomorganisert og proteksjonistisk omsetningsregime.

I tillegg til dette var det to mer praktiske forhold som spilte inn. Det ene var ressurskrisen i torskefiskeriene på begynnelsen av 1990-tallet, som gjorde at fiskeindustrien slet med råstofftilførselen og elendige økonomiske resultater. Den andre var Sovjetunionens fall, som gjorde det mulig, i hvert fall på kort sikt, å utnytte en annen råstoffkilde. Omveltningene i øst hadde nemlig som en av sine mer spuriøse konsekvenser ført til at den russiske trålerflåten stod klar til å selge sine fangster i Finnmark. En speilvending av Sjøgrenseloven ville dermed oppheve en byråkratisk hindring for å løse den akutte råstoffkrisen for den norske filetindustrien. Som det framgår av Figur 6 varte direkteimport av russisk ferskfisk i en forholdsvis kort periode. Fra midten av 1990-tallet begynte importen av ferskfisk å skrumpe inn og ble gradvis erstattet av rundfryst fisk i transitt.

På lengere sikt fikk speilvendingen av sjøgrenseloven større betydning ved at den svekket grunnlaget for den gamle næringsmodellen, bygd på gjensidige forpliktelser mellom flåte og industri. Når fiskeindustrien fikk mulighet for å hente råstoff i internasjonale markeder, måtte selvsagt fiskerne ha tilsvarende mulighet til å selge sitt råstoff internasjonalt. Speilvendingen av sjøgrenseloven, i samvirke med den generelle liberalisering av fiskerilovgivningen, fungerte dermed som startpunkt for og legitimering av en ny praksis. Med etableringen av de såkalte frysehotellene, der råfisken lagres i påvente av eksportsalg, kom det i løpet av kort tid på plass en infrastruktur som gjorde at fiskerne kunne utnytte det voksende globale råstoffmarkedet. Speilvendingen, som i utgangspunktet var ment å lette situasjonen for filetindustrien og som møtte motbør fra fiskernes organisasjoner i høringsrunden (Ot.prp.nr. 61, 1991–1992), la grunnlaget for at vesentlige deler av flåteleddet kom løs fra sin avhengighet av landindustrien.



Figur 6 Landinger av torsk fra russiske fiskefartøy i Norge omregnet til rund vekt (Kilder: Fiskeridirektoratet, Norges Råfisklag og Sevryba)

Speilvendingen av Sjøgrenseloven svekket altså det lovmessige grunnlaget for den gamle næringsmodellen og bidro til at relasjonene mellom fartøyer og bedrifter ble annerledes. Etter hvert fikk dette også konsekvenser også på tvers av de etablerte avtalerelasjonene mellom fartøyer og industribedrifter. Slik vi allerede har sett fikk trålerne, i tråd med innstillingen fra Torskefiskeutvalget, innpass i norsk fiskerinæring i kraft av å være forsyningsinstrumenter for filetindustrien. I mange tilfeller var denne koplingen lagt inn som eksplisitte klausuler i de enkelte trålernes konsesjonsvilkår, slik at de hadde plikt til å levere sine fangster (eller deler av den) til bestemte filetanlegg (Dreyer *et al.,* 2006). Med utgangspunkt i den gamle næringsmodellen og innenfor det korporative forhandslingsregimet, der norsk fangst i hovedsak skulle leveres og bearbeides i Norge, var slike leveringsforpliktelser forholdsvis uproblematisk. Forpliktelsene angikk primært fordeling av råstoffet mellom anlegg i Norge, med minsteprisen som et greit utgangspunkt for å beregne oppgjøret mellom partene. I takt med at de gjensidige forpliktelsene mellom flåteledd og industri ble svekket, samtidig som frysehotellene ga mulighet for direkteeksport av rundfrossen fisk til høyere priser, ble leveringsforpliktelsene mye mer tyngende og problematiske. I mange tilfeller kunne nå bedriften ikke betale den pris for fisken de hadde kontraktsmessig rett til, men som ellers kunne oppnås ved direkteeksport. Å overholde leveringsforpliktelsene ville dermed innebære et direkte tap for trålselskapet. I praksis innebar dette et økende mislighold av leveringsforpliktelsene (Flåten, 2002; Dreyer *et al.,* 2006; Trondsen & Ørebech, 2012).

Kontroversene rundt trålernes leveringsforpliktelser viser hvordan globaliseringsprosessen gradvis har trengt inn i norsk fiskerinæring og utfordrer den gamle samfunnskontrakten. I utgangspunktet regulerer slike leveringsavtaler forholdet mellom en selger og en kjøper, slik at det er opp til sistnevnte, det vil si det begunstigede landanlegg, å forfølge saken dersom de avtalte leveranser uteblir. Når denne mekanismen i mange tilfeller ikke har vært tilstrekkelig for å sikre fiskeindustrien råstoff, kan det selvsagt ha gode grunner sett fra bedriftenes perspektiv. De mange kontroversene i forbindelse med leveringsforpliktelsene det

siste tiåret må forståes nettopp fordi leveringsforpliktelsene i sin tid ble etablert ut fra – og stadig oppfattes som – et forhold som går ut over det rent forretningsmessige. Leveringsavtalene gjelder ikke bare fartøyets forhold til bedriften, men springer ut av de forpliktelser fartøy og bedrift har i fellesskap til lokalsamfunnet. Når slike forpliktelser er skrevet inn i trålernes konsesjonsvilkår, kan det ikke være opp til bedriften å bestemme om de skal gjøres gjeldende eller ikke. Leveringsforpliktelsene er – ut fra dette perspektivet – en institusjonell garanti for lokalsamfunnets plass i verdiskapningen i fiskeriene. Brudd på leveringsforpliktelsene forstås dermed ikke bare som et svik mot den begunstigede bedrift, men også som et svik mot det kystsamfunn der bedriften befinner seg.

Selv om dette gir god mening i lys av den gamle samfunnskontrakten, og da særlig med tanke på trålernes innpassing i norsk fiskerinæring, har globaliseringsprosessen gjort det vanskelig å følge opp slike forventninger i praksis. Hvis filetbedriftene ikke er i stand til å betale markedspris for råstoffet, hvor langt og med hvilke midler kan myndighetene gripe inn? Ved evalueringen av leveringsforpliktelsene ved begynnelsen av 2000-tallet kom departementet og regjeringen fram til at de etablerte kontrakter ikke lenger kunne tolkes bokstavelig. Fra 2003 ble forskriftene endret slik at leveringsplikten ble omgjort til en tilbudsplikt. De begunstigede bedrifter hadde ikke lenger krav på å motta fangstene, bare forkjøpsrett til markedspris etter en særskilt prosedyre (Dreyer *et al.,* 2006). Med dette er plikt-elementet i leveringsplikten svekket. I stedet for en relasjon mellom tre parter, der lokalsamfunnets interesser i saken var gjort eksplisitt og sanksjonert ved offentlige konsesjonsvilkår, har leveringsforpliktelsen blitt til en rituell øvelse mellom fartøy og bedrift uten praktisk betydning eller mulighet for offentlig intervensjon.

Forventninger og svik

Gjennomgangen i det foregående viser at det har skjedd endringer og i en viss forstand en svekkelse av den gamle samfunnskontrakten for fiskeriene. I økende grad blir filetbedriftene eksponert for konkurransen i det globale fiskevaremarkedet, og muligheten for å skjerme dem blir svekket. Endringene i de institusjonelle rammebetingelsene innebærer en nedtoning av de forventningene som tidligere hadde blitt stilt til fiskeriene som samfunnsbærende sektor. Selv om et fåtall filetanlegg fortsatt har status som hjørnesteinsbedrifter, er denne statusen nå betinget av en lønnsom drift. Der den samfunnsbærende rolle tidligere har hatt forrang fremfor kravet om effektivitet og lønnsomhet, har det gradvis blitt motsatt.

Til tross for oppgjøret med det direktør Vik på Finotro hadde kalt "virksomhetens noe sosialbetonte karakter" kan vi likevel ikke snakke om noe fullstendig avvikling av gamle forventningsstrukturer. Samtidig med at filetsektoren har vært nødt til å forholde seg til tøffere konkurransebetingelser i det globale varemarked for råstoff og det nasjonale arbeidsmarkedet, har noen av de gamle forventninger og krav blitt holdt ved like. Vi skal i det følgende se nærmere på hvordan dette skjer.

Finnmark spiller en viktig rolle i denne sammenheng. Det henger sammen med den dominerende posisjon filetindustrien har hatt i næringsstrukturen i fylket. Slik vi har sett var det særlig to grunner til at Finnmark ble det sentrale satsingsområdet da filetindustrien ble bygget opp etter krigen. Dels var det, som allerede Stortingets Kjøle- og frysekomite påpekte i 1931, at råstofftilførselen her var mest stabile over året. I tillegg kom det at det strukturelle problemet moderniseringsprosjektet skulle løse, fraværet av moderne næringsvirksomhet, var mest påtrengende her. Både mulighetsrommet for og virkningsgraden av en industrietablering med utgangspunkt i fiskeriene var dermed ideell i Finnmark.

Resultatet ble at filetindustrien fikk et tungt geografisk nedslagsfelt i det nordligste fylket. Filetanlegg ble etablert i de fleste kystkommunene i fylket, fra Loppa i vest til Vardø i øst. Næringsmiddelindustrien i Finnmark, der filetindustrien var dominerende, hadde på 1970-tallet 3.500–3.800 sysselsatte. Filetbedriftene i Finnmark stod på dette tidspunktet for om lag halvparten av norsk eksport av fryst filet. I 1980 utgjorde næringsmiddelindustrien 85 prosent av industrisysselsettingen i Finnmark (SSB) og var den eneste industrisektoren av betydning i kystkommunene. I kystsamfunnene i Finnmark utgjorde fiskeindustribedriftene hjørnesteinsbedrifter i egentlig forstand.

Filetindustriens dominans i Finnmark har selvsagt også hatt som konsekvens at nedgangstidene siden 1980-tallet i særlig grad har rammet fylket. Ved inngangen til 80-tallet var det 44 anlegg i Finnmark som produserte filet (av totalt 105 hvitfiskanlegg i fylket) (Fylkesplan 1980–83). På samme tid var det om lag 100 filetanlegg på landsbasis (Sogn-Grundvåg *et al.,* 2008). Ved utgangen av 2011 var det 7 filetanlegg tilbake i Finnmark, mens ytterligere 30 bedrifter drev annen produksjon av hvitfisk (Bendiksen, pers med.). I et fylke der industrisysselsettingen ligger på det halve av landsgjennomsnittet (4,8 mot 9,5 prosent) stod næringsmiddelindustrien ennå i 2010, for 58 prosent av de industrisysselsatte (SSB).

Filetindustriens tunge tilstedeværelse i Finnmark, og fylkets ensidige avhengighet av denne sektoren, har gitt grunnlag for en systematisk samfunnsmessig og politisk mobilisering for å beskytte sektoren når denne har vært under press. Det er ikke vanskelig å forstå hvorfor dette skjer. I de kystsamfunnene der filetanleggene er hjørnesteinsbedrifter, oppstår et skjebnefellesskap mellom samfunn og bedrift. I slike situasjoner vil kommunens organisatoriske og politiske apparat mobiliseres i kampen for arbeidsplasser hvis bedriften er truet. Når ordførerne i for eksempel Lebesby og Hammerfest engasjerer seg i spørsmål om råstofftilførsler, konsesjonsvilkår og leveringsbetingelser, er det nettopp et uttrykk for dette skjebnefellesskap.

Nå er dette ikke unikt for filetindustrien, men gjelder alle hjørnesteinsbedrifter, enten de produserer fiskefilet, solcellepaneler eller papir. I Finnmark forsterkes og utdypes mønsteret ved at alle de fleste kystkommunene er i samme situasjon. I stedet for en enkel stemme, et nødrop fra et enkelt utkantsamfunn truet av arbeidsledighet og fraflytting, blir det i Finnmark et helt kor av ordførere med samme engasjement og agenda. Dette fanges så opp og forsterkes på neste politiske nivå, der fylkesordføreren, stortingsrepresentanter og andre gjør seg til talsmenn for en kriserammet kyst. Når Kristina Hansen (Hansen, 2011), fylkeslederen i Kommunenes Sentralforbund, henstiller til sentrale myndigheter om å sørge for at Aker opprettholder forpliktelsene til at torsken bearbeides i kystsamfunnene i Finnmark, er det på vegne av alle kystkommuner under press. Når Ingalill Olsen (Olsen, 2011), Stortingsrepresentant for Arbeiderpartiet i Finnmark, maner til kamp mot Røkkes "ran av Finnmark" henter hun kraft og legitimitet i denne bevegelsen.

Med dette er det lettere å forstå at lønnsomhetsproblemet i filetindustrien, som i utgangspunktet rammer hele sektoren, i stor grad blir profilert som en Finnmarkskrise. Det er ikke primært fordi sektoren her har andre eller større utfordringer enn ellers i landet, men fordi disse, i mangelen av en differensiert økonomisk struktur i fylket, enkelt transporteres over til kommunale og fylkeskommunale arenaer der den gis organisatorisk fundament og politisk kraft. Nettopp på grunn av skjebnefellesskapet mellom kystsamfunn og filetbedrift tar krisen form som en restaurasjon av den gamle samfunnskontrakt og ideen om fiskeriene som samfunnsbærende sektor. Der den nasjonale økonomiske orden og globaliseringsprosessen generelt har ført til at fiskerisektorens samfunnsansvar i økende grad har fokus på det økonomiske oppdrag, peker politiseringen av krisen i Finnmark mot-

satt vei. Fordi lønnsomhetsproblemet i fiskeindustrien truer kystsamfunnene, og en ikke lenger kan stole på industrialistene, må krisen løses ved at staten griper inn. I Helga Pedersens "Fiskeripolitikk med Finnmarksvri" (Pedersen, 2004), det mest ambisiøse forsøket på å formulere et integrert politisk reformprogram med utgangspunkt i en slik kriseforståelse, ser vi konturene av en oppdatert samfunnskontrakt etter gammelt mønster, nå med fylkeskommunen som garantist og vokter av samvirket mellom fiskerisektor og kystsamfunn.

I lys av globaliseringen av fiskevaremarkedene, og de tilpasningene i nasjonale og internasjonale rammebetingelser som følger av dette, er det ikke så enkelt å se hvordan et slikt program skulle kunne gjennomføres. Det synes i hvert fall å forutsette en retur til proteksjonistiske løsninger og korporativistisk samrøre som har svinnende legitimitet, i hvert fall som en generell samfunnsmodell. I denne sammenhengen er det likevel grunn til å påpeke at forestillingen om fiskeriene som samfunnsbærende sektor, og myndighetens plikt til å sikre dette, fremdeles står sterkt i manges bevissthet. Til tross for at globaliseringsprosessen har endret spillereglene i fiskerisektoren fundamentalt, og dette har fått bredt gjennomslag i praktisk politikk og lovgivning, kan en neppe si at det er forankret i en tydelig uttalt næringspolitisk analyse og planstrategi. Tvert imot, kan en vel si. Forestillingen om den gamle samfunnskontrakten henger stadig med, ikke bare i reformforslagene fra nord. Dels lever de godt i form av politiske målformuleringer, for eksempel i form av formålsparagrafer i fiskerilovgivningen (Trondsen & Ørebech, 2012: 83–91). Dels videreføres de i form av halvhjertede endringsprosesser, som i spørsmålet om trålernes leveringsforpliktelser.

Det siste eksemplet, trålernes leveringsplikt, er illustrerende for situasjonen mer generelt. Som vi allerede har sett har pliktelementet i leveringsplikten blitt redusert, slik at ordningen i praksis er et spørsmål om en rituell tilbudsordning. Mens leveringsplikten videreføres som formell ordning, og dermed bekrefter ideen om lokalsamfunnet som en legitim og viktig interessent, fornektes dette ved at ordningen ikke har innhold. Leveringsplikten vedlikeholder illusjonen om samfunnskontrakten av gammelt merke, og gir dermed opphav til en følelse av svik når den verken har rettslige eller økonomiske konsekvenser.

Fra krise til krise

Artikkelen startet med et paradoks. Mens det koker av fisk i havet, er det krise for landanleggene langs kysten. Vi vet nå hvorfor det er slik. I det globale fiskevaremarkedet lønner det seg bedre for fiskerne å eksportere fisken direkte enn å selge lokalt. Filetbedriftene er ikke effektive nok; de kan ikke hevde seg i konkurransen om råstoff og arbeidskraft. Nærheten til fiskefeltene er ikke lenger et komparativt fortrinn for filetsektoren.

Krisen i filetindustrien er med andre ord ikke et paradoks i egentlig forstand. Men vi har også fått en forklaring på hvorfor den kan oppfattes som et paradoks. Lønnsomhetsproblemet blir til et paradoks når det betraktes ut fra en bestemt synsvinkel og situasjonsanalyse, den gamle samfunnskontrakten for fiskeriene. Det sentrale premiss i denne samfunnskontrakten, videreført og fornyet i moderniseringsprosjektet på 1950- og 60-tallet, var at fiskeriene som samfunnsbærende sektor. Ved hjelp av fryseteknologi, trålerdrift og industriproduksjon skulle kystsamfunnene ta skrittet inn i den moderne tid. Dette prosjektet bygget på og videreførte forutsetning om skjebnefellesskap mellom kystsamfunn og fiskerisektor. Forestillingen om nærheten til fiskefeltene som komparativt fortrinn ble institusjonalisert. I den grad denne samfunnskontrakten stadig kan vedlikeholdes og anvendes som fortolkningsramme, framstår fiskeindustriens lønnsomhetsproblem stadig som et paradoks.

Dermed er vi fremme ved forklaringen av hvorfor filetindustrien går fra krise til krise. Når krisen blir permanent skyldes det ikke lønnsomhetsproblemet i seg selv, men i misforholdet mellom de økonomiske rammebetingelser filetbedriftene arbeider under og de forventninger som stilles til dem. På den ene siden er det åpenbart at rammebetingelsene gjør lønnsom filetproduksjon i Norge vanskelig. På den andre siden vedlikeholdes forestillingen om at fiskeribedriften skal bære kystsamfunnet. Det er i sameksistensen av disse to motstridende virkelighetsforståelser krisen blir permanent.

Selv om den gamle samfunnskontrakten stadig holdes ved like, kan en stille spørsmål om dens reelle gjennomslagskraft og betydning. Snakker vi om forventninger som primært har symbolsk betydning, eller er de førende for økonomiske disposisjoner og politiske beslutninger? En antydning til svar kan leses ut av Helga Pedersens reise fra posisjonen som fylkesordfører i Finnmark til å bli stortingsrepresentant og fiskeristatsråd i Stoltenbergs regjering fra 2005. Pedersen politiske program var tuftet på "Fiskeripolitikk med Finnmarksvri. "Vel framme i sin nye maktposisjon forsøkte statsråden med betydelig kraft å iverksette denne planen, blant annet i en revisjon av Strukturpolitikken og ved regional omfordeling av fiskekvotene. Resultatet ble imidlertid magert, med videreføring av strukturpolitikken (St.meld. nr. 21, 2006–2007) og en lite vellykket distriktskvoteordning (Hermansen *et.al.,* 2007 og 2008). Mens den gamle samfunnskontrakten stadig holdes i hevd, i hvert fall som politisk retorikk og lengst mot nord, er den for svak til å gi gjennomslagskraft i nasjonal politikk på tvers av globale strømninger, nasjonal politikk og økonomiske maktstrukturer.

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Fiskeriforvaltning i bevegelse

Nordiske fiskerier, fra konvergens til divergens?

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Sammendrag på norsk:
Hvorfor utvikler Nordisk fiskeriforvaltning seg på forskjellige måter? Etter innføringen av det nye havrettsregimet på 1970 og 1980-tallet så de nordiske landene til hverandre i arbeidet med å etablere en nasjonal ressursforvaltning. På grunn av dette, og fordi de grunnleggende utfordringene var felles, fikk forvaltningen i de ulike landene sterke likhetstrekk. I de senere år har dette imidlertid endret seg. Det internasjonale ressursforvaltningsregimet er under endring, med særlige krav til økt markedsstyring og økt fokus på økosystembasert forvaltning. Artikkelen redegjør for hvordan de nordiske landene responderer på denne utviklingen og drøfter hvordan ulik grad av eksponering for nye utfordringer gjør at nordisk fiskeriforvaltning nå divergeres.

Sammendrag på engelsk:
Why does fishery management in the Nordic region develop in different ways? After the introduction the new oceans regime in the 1970s and 1980s, the Nordic countries saw to each other in the work of establishing a national resource management system. As a result of this, and because the basic challenges were the same, fishery management was developed along the same lines. In the last few years, this has changed. The international resource management regime is being criticized and there are pressures for reform. Increasing reliance on market mechanisms and commitments to ecosystem-based considerations in management are demanded. The article gives an account of how the Nordic countries have responded to this development, and discusses how different levels of exposure to new challenges cause divergence in the Nordic fishery management systems.

Innledning

Ved etableringen av det internasjonale havrettsregimet fikk kyststatene råderett over store havområder og samtidig et omfattende forvaltningsansvar. Utviklingen og implementeringen av en effektiv og legitim ressursforvaltning var en formidabel oppgave, hvor overfiske, overkapasitet og lav lønnsomhet gikk igjen som overskrifter for de utfordringene som måtte løses. Debattene har i stor grad omhandlet balanseforholdet mellom fiskere, myndigheter og mer allmenne interesser. Forvaltningens oppgave har vært å utvikle gode instrumenter og kontrollsystemer for å ivareta kyststatens forvaltningsansvar, og samtidig sikre næringsaktørene gode og stabile rammebetingelser. Prosessen har til tider vært preget av sterk uenighet og kamp om fordeling av knappe ressurser, gjerne i krisepregede situasjoner med nedfiskede bestander og presset økonomi.

I Norden har landene sett til hverandre i dette arbeidet. Resultatet har blitt at fiskeriforvaltning i Norden har vært bygd opp etter omtrent samme modell, med egne fiskeridepartementer, sektorbasert implementeringsstruktur og dedikerte forskningsinstitusjoner. I en studie av fiskerinæringene i Vest-Norden fra 1992 ble det konkludert med at vi går mot en standardisert fiskeripolitikk i de nordiske land. Til tross for betydelige forskjeller mellom sektorene, både historisk, sosialt og økonomisk ble det sagt at:

> *"Det hersker liten tvil om at imitasjon har gode vilkår i fiskerinæringa – ikke bare i forhold til fangst- og foredlingsteknikk, men også når det gjelder sty-*

ringsinstrumenter og administrative rammebetingelser mer generelt." (Hersoug, 1992:4)

Utviklingen mot en felles nordisk modell for fiskeriforvaltning skyldtes ikke bare at utfordringene med å etablere et nasjonalt ressursforvaltningsregime dro i en og samme retning. I tillegg ble fiskeriene i de nordiske land i stadig større grad ble eksponert for mer liberale handelsregimer. Da den siterte studien ble skrevet, var bare Danmark medlem av EU (den gang EF), men de andre landene vurderte sin holdning til et mulig medlemskap. Tilpasning til EUs handels- og næringsregime, enten via medlemskap eller en eventuell EØS-avtale, ville medføre en enda sterkere markedstilpasning i næringene. Dette ville føre til endringer i fiskeriforvaltningen, der andre hensyn ville måtte vike for å sikre fiskerienes konkurransedyktighet. På denne måten ville nordisk fiskeriforvaltning bli mer og mer lik.

I 2012, tjue år senere, er alle de nordiske landene i ferd med å gjennomføre endringer i den organisatoriske og institusjonelle oppbyggingen i grunnlaget for fiskerisektoren. Slik Hersoug spådde, er effekten av den økende liberaliseringen av det internasjonale handelsregimet sterk og klar. Økt markedsstyring påvirker også styring og administrasjon, hvor det de siste årene har vært et stadig større fokus på effektivisering av offentlig forvaltning. I tillegg har kyststatenes forvaltningsansvar endret seg som følge av internasjonale konvensjoner, avtaler og retningslinjer om fiskerier og det marine miljø. Mens fokuset tidligere primært har vært på forvaltningen av de store kommersielle bestandene, har ansvaret etter hvert blitt utvidet til å omfatte også det marine økosystemet som helhet.

Siden sentrale påvirkningsfaktorer i stor grad er felles og forankret i internasjonale prosesser, kunne en kanskje forvente at tendensen til standardisering og felles løsninger i Norden ville bli ytterligere styrket. Likevel synes det som om fiskeriforvaltningen i de nordiske land nå er i ferd med å ta ulike retninger. Selv om markedsstyringen gjør seg gjeldende i alle landene, og ambisjonene om å utvikle mer økosystembaserte forvaltningsløsninger er felles, er det klare tendenser til at disse utfordringene håndteres på ulike måter. Noen land kjemper for å holde sektoren stabil og søker å konsolidere den etablerte modellen, mens andre land ser ut til å akseptere større endringer til tross for de kostnadene dette medfører. I enkelte land ser det ut til at staten trekker seg noe tilbake fra næringen, mens andre land fortsatt har et aktivt apparat for å sikre lønnsomhet i fremtidens fiskerier. Selv om økosystembasert forvaltning har tilslutning i alle land, synes det som om fortolkningen av hva dette innebærer er forskjellig. I enkelte land er bærekraft og miljøhensyn verdier i seg selv, mens det i andre land er den kommersielle verdien av en langsiktig forvaltning som er det sentrale. Samtidig har betydningen av EU blitt større og fører til større forskjeller mellom de nordiske land som er medlemmer og de som har valgt å stå utenfor.

I denne artikkelen vil vi drøfte i hvilken grad fiskeriforvaltning i Norden har gått fra konvergens til divergens. Hva er årsakene til at de nordiske fiskeriforvaltningene nå, fra å ha gått i takt, ser ut til å ta ulike veier? Vårt utgangspunkt er ideen om at de ulike landene ikke er like følsomme for de endringsfaktorene de eksponeres for. Dette henger igjen sammen med hvilke verdier som legger grunnlag for de ulike landenes forvaltningsløsninger.

I det følgende vil vi vil utforske denne hypotesen. Først vil vi drøfte hvordan det gjeldende ressursforvaltningsregimet er under endring. Et mangfold av nye interessenter til utnytting av havets ressurser har satt den tradisjonelle fiskerivirksomheten i nye posisjoner, noe som krever samordning med og avveininger mot andre samfunnsinteresser knyttet til marin virksomhet. Vi vil drøfte hvordan økt markedsstyring og bevegelsen mot økosystembasert forvaltning påvirker hvordan fiskeriene utvikler seg. På grunnlag av dette vil vi vise hvordan fiskerisektorene i de nordiske landene

responderer forskjellig ved å drøfte sosio-økonomiske effekter, endringer i metoder for nasjonal ressursforvaltning og endringer i nasjonale styringsstrukturer i de respektive land. Avslutningsvis vil vi diskutere årsakene til de ulike endringene og drøfte hvilken sammenheng dette har med hvorfor forvaltningene responderer forskjellig.

Forvaltningsregimet - endrede krav, interesser og forventninger

Dagens forvaltningsregime i fiskeriene er basert på en internasjonal enighet om at fisket må reguleres for å hindre overfiske. Kjernen i regimet er beregningen av hvor mye som er forsvarlig å fiske av en bestand: total allowable catch, eller TAC. Gjennomslaget for dette regimet kom med etableringen av økonomiske soner i 1977, hvor kyststatene fikk råderett men også forvaltningsansvar for ressursene i havsonen (Churchill & Lowe, 1999).

Det internasjonale TAC-regimet er imidlertid gjenstand for mye kritikk. Først og fremst fordi det ikke synes å fungere etter hensikten. Det er fortsatt mange bestander under bærekraftige nivåer (Morgan, 2001). Dette kan skyldes at kvotene ikke overholdes eller at de er fastsatt på feilaktig grunnlag. Videre er TAC-systemet både dyrt og byråkratisk. Å overvåke bestandsutviklingen og gi gode råd om forsvarlig fangst krever en omfattende forskningsaktivitet. Hele prosessen for datainnsamling, estimering, rådgivning og kvotefastsettelse er svært kostnadskrevende og sårbar for mange typer feil (Scwach *et al.,* 2007). Ikke minst er det et omfattende oppfølgingsarbeid for å overvåke og kontrollere at det ikke fiskes mer enn tillatt av den enkelte bestand. Et særlig problem er at forvaltningssystemet i hovedsak har hatt fokus på enkeltbestander, og i liten grad vært i stand til å ta høyde for økologiske endringsprosesser eller konsekvensene av fangstvirksomheten på andre arter (Nielsen & Holm, 2007).

Kritikken mot TAC-regimet er mangfoldig og sprikende (Degnbol *et al.,* 2006). Selv om mange er enige i svakhetene, er det mye vanskeligere å finne fram til bedre løsninger. Likevel kan en konstatere at det eksisterende regimet har lav legitimitet og at interessen for å utvikle nye forvaltningsmodeller er betydelig. Det er særlig to utviklingsstrømmer som har stor innflytelse. Det ene er i større grad å ta i bruk økonomiske modeller og på den måten delegere flere forvaltningsoppgaver til markedsmekanismene. Den andre dreier seg om forsøkene på å utvide målområdet for forvaltningen ved å gjøre den mer helhetlig og økosystembasert.

Økt markedsstyring

Det nye havrettsregimet ga kyststatene råderett over store ressurser samtidig som land som tidligere hadde fisket i disse områdene fikk et økt behov for å importere fisk. På denne måten stimulerte nasjonaliseringen av ressurser til en økt globalisering av fiskehandel. Ytterligere tre faktorer muliggjorde og forsterket denne prosessen (Arbo & Hersoug, 1997). For det første har det vært en formidabel utvikling og spredning av ny teknologi. Mer effektive løsninger både for fangst og produksjon, pakking og lagring, samt transport og kommunikasjon har gjort at fiskeriene har hatt en økt produktivitet og bedre forutsetninger for å levere til markeder også langt unna fangst- og produksjonsstedet. For det andre har makten til den industrielle aktøren bare økt som følge av dannelse av store multinasjonale selskaper. Både for å øke sine komparative fortrinn og for å senke kostnadene har selskapene vært pådrivere for innovasjoner og "global sourcing". Som en konsekvens har verdikjeden blitt internasjonalisert ved at de ulike delene av foredlingen har foregått på ulike steder og tiltenkt diversifiserte markeder. For det tredje har verdenshandelen generelt blitt mer liberalisert. Handelsbarrierer har gradvis blitt fjernet, også for primærnæringsprodukter. Ulike avtaler og konvensjoner signaliserer

at dette har vært både ønskelig og nødvendig for land som er avhengig av eksport og import. For de nordiske land har dette blitt særlig gjeldende via EFTA/EØS og EF/EU, som også den siterte rapporten (Hersoug, 1992) poengterte.

Fiskeriforvaltningen har på ulike måter tilpasset seg til denne utviklingen. Fisk har blitt et viktig handelsprodukt, og fremfor å regulere markedet har fiskeripolitikken i stadig større grad blitt endret til å tilpasse næringene til markedets sammenhenger. Dette viser seg på flere måter. For det første har det ført til økende restriksjoner på bruk av subsidier som virkemiddel. Subsidier har i flere land blitt brukt for å hjelpe fiskerinæringen gjennom kriser, for å bøte på strukturendringer eller andre grunner til lav lønnsomhet. I et markedsperspektiv er subsidier konkurransevridende fordi de favoriserer næringsaktører som ikke nødvendigvis er de mest konkurransedyktige. Fri konkurranse er en av søylene i EUs markedspolitikk. For medlemslandene, eller de som er tilsluttet det indre markedet via EØS-avtalen, har slik konkurransevridende støtte blitt forbudt. Opphør av subsidier har på denne måten vært mer eller mindre frivillig i de ulike berørte landene.

For det andre brukes markedsmekanismer i økende grad for å fordele kvoter. Uten utfyllende reguleringer oppmuntrer totalkvoten til konkurransefiske som igjen gjerne fører til overinvesteringer (Kura *et al.,* 2004) og store skjevheter i markedstilbudet (Sutinen & Soboil, 2003). Ved å fordele TAC på mindre kvoter kan man bøte på slike uønskede effekter. Bruk av individuelle kvoter har vist seg som effektivt for å holde bestandene innenfor TAC-grensen (ibid). Når slike kvoter i tillegg kan omsettes får fiskerne et incentiv til å forvalte kvoten godt og til å kvitte seg med den dersom den ikke utnyttes optimalt. Nedsiden ved slike virkemidler er at det kan føre til konsentrasjon av konsesjoner og på måten resultere i at intensjonen med å fordele fiskerettigheter ikke nås (Palsson & Helgason, 1995). En annen bieffekt av individuelle kvoter er at de er vanskelig å administrere i blandede fiskerier (Morgan, 2001). Fiskere oppmuntres til å kaste ut fisk av lav verdi for å spare sin andel av kvoten til en mer verdifull fangst. Utkast er et stort problem i dagens fiskerier.

For det tredje viser økt markedsstyring seg i et økt fokus på effektivisering av offentlig forvaltning, særlig inspirert av ideer som New Public Management (Se Kettl, 1997; Klausen, 2001). Hensikten har vært å sikre større samsvar mellom behov og ressursbruk og virkemiddelbruken har i stor grad vært økt markedsorientering som for eksempel konkurranseutsetting og privatisering. Resultatet er at det åpnes for større grad av medvirkning og prinsipper om "good governance" i fiskeriforvaltningen. Det blir mindre detalj- og kontrollstyring og fiskerne selv får mer ansvar. I tillegg til eierskap til kvoter er ressursavgift et eksempel på dette. Ved å innføre en ressursskatt på fangst kan myndighetene sikre at utøverne opptrer optimalt framfor å detaljregulere hvordan de fisker.

Resultatet av en økt markedsstyring fører på denne måten til at fiskerisektoren i stadig større grad må bli mer effektiv, mer profesjonell og mer innovativ enn tidligere.

Utvidet miljøperspektiv og økosystembasert forvaltning

I de senere år har det vært et økt politisk og samfunnsmessig fokus på miljø og klima generelt. Økte problemer med utkast, samvirket mellom ulike næringer og påvirkning på andre marine arter har vært satt på dagsordenen. I denne sammenhengen har økosystemet blitt viet større oppmerksomhet. Økosystemet er helheten av og samspillet mellom levende organismer, både vekster og dyr og det miljøet de lever i (Pikitch *et al.,* 2004). Når man anlegger et økosystemperspektiv på ressursforvaltningen innebærer det at man ser på ressursuttakets effekter, ikke bare på ressursen men på hele økosystemet. Fiskebestander eksisterer ikke i isolasjon. De er deler av komplekse marine økosystemer

med en mengde arter. For å høste av naturressursene holder det derfor ikke med kunnskap kun om bestanden som beskattes. Man trenger også en forståelse for dens plass i økosystemet, for eksempel hvor den lever, hva den spiser, hvem som spiser dem og andre relevante karakteristikker (Ecosystem Principles Advisory Panel, 1998). Videre leverer ikke økosystemet bare fisk, men også andre varer som for eksempel olje og bølgekraft, og tjenester som for eksempel algeproduksjon og muligheter for rekreasjon.

Fokuset på økosystemet har gjort at bærekraft som begrep har blitt utvidet i den offentlige debatt, og hensynet til en helhetlig forvaltning spiller en stadig større rolle. Å hindre for eksempel overfiske, handler ikke lenger bare om å sikre en optimal kommersiell utnyttelse, men om hensyn til miljø og bevaring i seg selv. Dette viser seg også i at oppmerksomheten skifter fra fiske og enkeltbestander til samlet miljøpåvirkning og økosystemet som helhet (Marasco *et al.,* 2007). Man vil vite hvilken effekt ulik næringsaktivitet, som fiske, men også skipstransport og petroleumsutvinning har, på fiskebestander, men også på økosystem- varer og -tjenester. Fiskerisektoren blir med dette en del av en større avveining, der andre og til dels motstridende interesser blir en del av helhetsbildet. Hensikten med et økosystemperspektiv i forvaltningen er på denne måten å forvalte slik at de negative effektene på økosystemet ikke overskrider gevinstene ved ressursuttaket.

Økosystembasert forvaltning er imidlertid ingen ferdigdefinert prosess med vedtatte regler og retningslinjer. Dette skyldes kompleksiteten i økosystemene. Å forstå hvordan økosystemene fungerer er en stor utfordring i seg selv. For eksempel er det utfordrende å forstå hvordan matkjedene henger sammen og hvordan naturlige svingninger i temperatur med tilhørende effekt på bestander varierer etter lokalisering og nærhet til land (Hayden & Conkling, 2007). En annen utfordring med økosystembasert forvaltning er at den er avhengig av oppdaterte vitenskapelige data om bestandsnivåer og forholdene i økosystemet. Det er omfattende og kostnadskrevende å hente disse dataene, og ikke minst å avgjøre hvordan de bør tolkes. Økosystemene følger heller ikke de juridiske grensene som folkeretten har regulert. En effektiv økosystembasert forvaltning er derfor avhengig av et betydelig regionalt og internasjonalt samarbeid.

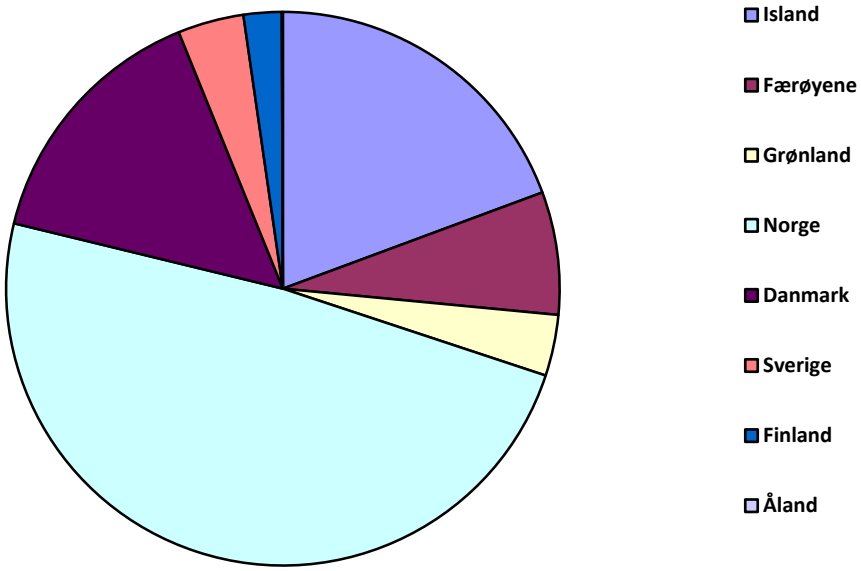
Selv om utfordringene ved å implementere en økosystembasert forvaltning er mange, er intensjonene høyst tilstede i internasjonale samarbeidskonstellasjoner. I folkeretten har disse hensynene fått plass i et tillegg til Havrettskonvensjonen (1982) som kom i 1995, i FN-konvensjonen om biologisk mangfold fra 1992 og konvensjonen om beskyttelse av det marine miljø i det nordøstlige Atlanterhav. De nordiske landene har på ulike måter og i ulik grad gitt disse hensynene plass og gjennomslagskraft. EU har utarbeidet en felles fiskeripolitikk for å se til at fisket utføres på en måte som er både økonomisk, miljømessig og sosialt bærekraftig. Både inkorporeringen av folkeretten og implementeringen av den felles fiskeripolitikken for EU-statene er imidlertid den enkeltes nasjons ansvar og de nordiske landene har løst dette på ulike måter.

Nordiske fiskerier - lik påvirkning, ulik respons

Til de nordiske fiskeriene tilhører landene Finland, Sverige, Danmark, Norge og Island, og i tillegg selvstyrene Færøyene, Grønland og Åland, ettersom de har råderett over egen fiskeripolitikk. Når vi i det følgende omtaler "de nordiske land" er alle disse åtte inkludert. De nordiske fiskeriene er blant verdens best forvaltede fiskerier (Nordic Marine Innovation, 2011). De utviklingslinjene som er presentert i det foregående påvirker likevel også disse fiskeriene. På hvilken måte de griper inn er avhengig både av fiskerisektorens betydning i landet

og hvilken legitimitet de ulike politiske verdiene har.

Målt i fangst er det Norge, etterfulgt av Island og Danmark som er de største fiskeristatene. Se figur 1. Hvis man ser på den relative betydningen for nasjonaløkonomien er sektoren viktigst for Færøyene og Grønland, og også Island. Sverige, Finland og Åland har relativt små fiskerier, både i størrelse og betydning. Landenes avhengighet til fiskeriene er med å avgjøre hvilke andre interesser som får fotfeste i samfunnsdebattene og følgelig preger de veivalg som tas.



Figur 1 Fordeling av total fangst mellom de nordiske land 2010 (Nordisk statistikkbank og Grønland Statistikk)

I tillegg til forhold i det enkelte land har det også betydning hvorvidt landene er medlem i EU og dermed omfattes av den felles fiskeripolitikken. Per i dag er Danmark, Sverige, Finland og Åland medlemmer. Island har søkt om medlemskap. Hensynet til fiskeri var en av grunnene til at Grønland meldte seg ut av EU i 1985 og var også tungtveiende i den norske folkeavstemningen som sa nei til EU både i 1972 og i 1994. Den felles fiskeripolitikken har vært utarbeidet siden starten på 1980-tallet. Målet har vært en lønnsom sektor og i 2002-reformen ble det også innført et førevarprinsipp som banet vei for en mer langsiktig fiskeriforvaltning. Blant annet ble det utarbeidet gjenopprettelsesplaner for bestander som var under sine sikre biologiske grenser samt flerårige forvaltningsplaner for andre bestander. Målet har på den måten også blitt å innføre en økosystembasert forvaltning. Til tross for en rekke regulativer er erfaringen i EU at fiskeriene sliter med overfiske, dårlig lønnsomhet og dårlig etterfølgelse av regelverket. I 2008 ble det derfor satt i gang en større revisjon av den felles fiskeripolitikken. EU-kommisjonen har presentert et reformforslag, som nå er til behandling hos parlamentet og skal etter planen vedtas i 2013. Rådet kom i juni 2012 til politisk enighet om hovedlinjen (general approach) i reformen. Basert på denne tegner utfallet av reformen blant annet til å bli en gradivs innføring av utkastforbudet fra 2014–2020. Maksimal bærekraftig fangst skal innføres for alle bestander innen 2015, og senest innen 2020 for de bestandene hvor datagrunnlaget enda

er for skjørt. Når det gjelder forslaget om obligatoriske omsettelige kvoter tegner det til at dette fortsatt blir frivillig for det enkelte medlemsland. Det endelige utfallet av reformen vil selvfølgelig påvirke fiskeripolitikken i EU-landene, og følgelig også få noe å si for nordisk fiskeriforvaltning som helhet (Se CFP Reform Watch).

I det følgende vil vi drøfte hvordan utviklingslinjene har påvirket de nordiske fiskeriene gjennom å se på sosioøkonomiske effekter, endringer i metoder for nasjonal ressursforvaltning og endringer i styringsstruktur. Redegjørelsen baseres på en rapport hvis formål var å sammenligne strukturelle, institusjonelle og politiske endringer i Nordisk fiskeripolitikk (Holm & Tveiterås, 2012). Rapporten var bestilt i forbindelse med Nordisk ministerråds fiskerikonferanse "fiskeripolitikk i bevegelse" i Tromsø, oktober 2012. Det empiriske materialet ble basert på intervjuer med representanter for de ulike landene tilknyttet den Nordiske marine tenketanken og Nordisk embetsmannskomité for fiske og havbruk. Alle informanter fikk mulighet til å lese og kommentere det som ble framlagt, og kommentarene ble også innarbeidet i rapporten. Dataene er begrenset ved at vi ikke har intervjuet noen fra fiskerinæringene, noe som kunne bidratt til å gjøre presentasjonen fyldigere og muligens mer nyansert. Informantene har likevel snakket på vegne av sine lands sektorer, og det er vår oppfatning at redegjørelsen gir et aktuelt inntrykk av statusen i nordisk fiskeriforvaltning.

Sosioøkonomiske effekter

At fiskebestandene er sårbare og ressursgrunnlaget begrenset har vært et sentralt premiss for fiskeripolitikken de siste 40 årene. Økt effektivitet kan derfor ikke kompenseres gjennom økt produksjon for å opprettholde sysselsettingen som i andre sektorer. Alle de nordiske land erfarer derfor nedgang i fartøy og sysselsetting for å opprettholde en nødvendig inntektsutvikling. Nedgangen oppleves likevel forskjellig.

I de østnordiske landene, hvor fiskeriene aldri har hatt noen dominerende betydning nasjonalt sett, blir næringene mer og mer marginale. I Finland og på Åland er fiskeri mer preget av å være fritidsfiske eller kombinasjonsyrke enn en solid næring. Oppdrett har også blitt mer sentralt enn tradisjonelt havfiske. I Sverige oppfattes nedgangen som nødvendig ut ifra et miljøperspektiv. Fokus her er mer på hvordan overkapasitet og overfiske har ødelagt store deler av økosystemet. Selv om mindre steder merker endringen godt synes den rådende oppfatningen å være at Sverige som samfunn må tilpasse seg de kravene en økosystembasert forvaltning stiller, mer enn å spekulere i hvor mye disse grensene kan tøyes.

I Danmark og Norge blir fiskerisektoren mer næringsdrevet enn før. Effekten av dette oppfattes likevel forskjellig. "Det har blitt bedre, men ikke lettere å være fisker i Danmark", sies det fra dansk hold, mens det i Norge påpekes at selv om det er færre som fisker er fiskerne de samme i politisk og kulturell forstand. Dette skyldes muligens ulik endringshastighet. I Danmark har strukturendringene kommet bråere på enn i Norge, som har hatt en jevn tilpasning over mange år. I Norge har fiskerisektoren historisk hatt en sterk distriktspolitisk profil der hensynene til kystfiskerne har hatt en sterk stilling. Dette preger fortsatt Norge i mye sterkere grad enn i Danmark. Selv om subsidier og særordninger avskaffes også her, er distriktspolitiske problemstillinger fortsatt aktuell i dagens fiskeridebatter. Aktuelt nå er industrieide tråleres leveringsplikt til norske fiskemottak. Både Danmark og Norge har imidlertid flere ben å stå på i nasjonaløkonomisk sammenheng. Selv om nedgangen merkes godt for enkeltfiskere og lokalsamfunn, har landene en sterk økonomi.

I Vest-Norden, hvor fiskeriene har vært en bærebjelke i samfunnet, påvirker nedgangen hele nasjonaløkonomien. På Grønland står sektoren for 93 % av landets totale eksport og en fjerdedel av sysselsettingen. I mange år har prisen på reker vært

synkende samtidig som prisene på importerte produkter generelt har vært stigende. Dette har forskjøvet balansen i bytteforholdet med omverdenen. Grønland har gjennom mange år kompensert for fallende priser i verdensmarkedet ved å øke produktiviteten i fiskeriene. Blant annet har den fastsatte totalkvoten for blåkveite ved kysten blitt forhøyet mot slutten av året for å bøte på de sosioøkonomiske effektene omstruktureringen av dette flåtesegmentet har hatt. Dette er av ressursmessige årsaker ikke lenger mulig, og det er derfor kjærkomment for den grønlandske økonomien at prisen på reker nå stiger.

På Færøyene, som sammen med Grønland er det mest fiskeriavhengige landet i Norden, har nedgangen i fartøy og sysselsatte ført til en sterk integrering av næringsaktører. Lønnsomheten opprettholdes, men til fordel for færre og færre aktører. Dette har ført til en debatt og eierskap til ressursene fordi fiske ikke på samme måte som før kommer hele samfunnet til gode. Samtidig står formålsparagrafen i den færøyske fiskerilovgivningen om at fiskeriene skal være arbeidsskapende for hele landet for fall. Spørsmålet er ikke lenger hvordan man kan holde på verdiskapningen i distriktene, men mer hvordan man kan holde verdiskapningen på Færøyene. Det synes derfor som at oppfatningen er at konsentrasjon av fiskerettigheter i seg selv ikke gjør noe, så lenge overskuddet tilkommer flere enn eierne av kvoter og store selskaper.

Island har innført en slik ressursskatt i fra og med 2012. Den sosiale kostnaden av nedgang i sysselsetting og konsentrasjon av kapital var en av årsakene til et økt politisk press for å komme med et slikt tiltak. Finanskrisen satte dette enda mer på spissen fordi krisen også gikk utover fiskeriene: Finansinvesteringer hadde blitt gjort med fiskefartøy, og dermed også kvoter, som pant, og da knekket i finansverdenen kom satte dette flere islandske fiskeribedrifter i en økonomisk klemme – til tross for at fiskeriene fortsatt gikk bra. Det er et økt krav i den islandske befolkningen om at slike disponeringer ikke bør være mulig. I tillegg til ressursskatt debatteres også kvotesystemet på Island i denne sammenheng. Dette kommer vi tilbake til under.

Ressursforvaltning

Når det gjelder den nasjonale ressursforvaltningen har samtlige nordiske land, eller er i ferd med å få, erfaringer med omsettelige fiskekonsesjoner. Island var først ute med et ITQ-system allerede i 1983. fordi den innsatsreguleringen som hadde vært de siste 10 årene ikke ga tilfredsstillende utslag på bestandsnivåene. Kvotene ble fordelt vederlagsfritt på grunnlag av fangststatistikken fra 1981-1983. Fram til 1990 fantes det likevel et alternativt system basert på innsats, noe som gjorde det vanskelig å begrense den totale fangsten. Først i 2004 var omsettelighet gjennomført som grunnprinsipp for alle fosleroene på Island.

I Norge har dagens ressursforvaltningsregime utviklet seg gradvis de siste 25 årene. Det er kjennetegnende for norsk fiskeripolitikk at endringer har kommet gradvis med små steg av gangen framfor store omveltninger. Dette skyldes i stor grad den korporative tilnærmingen som har preget sektoren. Fordelingsspørsmål har reist store samfunnsdebatter, særlig med tanke på geografisk konsentrasjon. Dagens regulering av fisket kan deles i tre hovedkategorier: adgang til å delta i fisket, reguleringer for fangstmønster og fangstuttak. Adgangsbegrensninger har i tillegg til å tilpasse innsatsen i fisket til ressursgrunnlaget som formål å oppnå en ønsket distriktsmessig fordeling av innsatsen. Det er i dag få norske fiskerier som ikke er underlagt deltakelsesbegrensninger. Fangstmønsteret reguleres ved hjelp av virkemidler som minstemål, maskevidde, stengte felt og utkastforbud, mens fangstuttaket reguleres ved fartøykvoter. Kvotene kan på visse vilkår omsettes innenfor samme fartøysegment. Selv om det ikke er et ITQ-system i Norge, har

det likevel gradvis utviklet seg til å ligne det.

Både det havgående og det kystnære rekefisket på Grønland har vært regulert via et ITQ-system siden henholdsvis 1990 og 1996. Fra og med inneværende år skal også det kystnære blåkveitefisket forvaltes via omsettelige kvoter, og det havgående blåkveitefisket fra og med 2013. I 2009 ble det nedsatt en fiskerikommisjon hvis oppgave var å komme med anbefalinger til fiskeripolitiske tiltak. I tråd med kommisjonens anbefalinger planlegger Grønland å innføre rettighetsbasert fiskeri på alle arter.
Etter mange års diskusjoner og ulike strukturordninger i Danmark kom den politiske beslutningen om å innføre et omsettelig kvotesystem. Dette ble gjennomført i 2007. Kvotene var først knyttet til fartøy, men fra 2008 vek man fra dette prinsippet og systemet er per i dag et ordinært ITQ-system. For å optimere det økonomiske utbyttet av kvotene og minimere problemer med utkast som følge av kvotemangel er de fleste fartøy tilknyttet grupper hvor kvoter kan leies og omsettes. Danmark er sammen med Storbritannia, og også Tyskland, Frankrike og Sverige, tilhenger av fangstkvoteforvaltning (catch quota management, CQM) og jobber for at dette skal bli en del av den nye forordningen i EU. Tanken er at ved å gi fiskeren både rettigheter og ansvar sikrer man en lønnsom og bærekraftig sektor uten en omfattende detaljregulering med tilhørende kontroll.

I EUs felles fiskeripolitikk var, som følge av dette, av forslagene til ny grunnforordning at alle landene skal regulere fangstinnsatsen gjennom omsettelige konsesjoner. I Sverige er det per i dag ulike ressursforvaltningsmodeller for ulike bestander. Rekefisket reguleres gjennom fiskedager, trålfisket forvaltes med ikke-overførbare årskvoter, mens det er konkurransefiske for det passive fisket med visse redskapsreguleringer. Det har vært brukt ulike rasjoneringsmekanismer for å spre det frie fisket utover året, men de siste årene har ikke kvoten for det passive fisket blitt fisket opp. For regulering av pelagisk fiske ble det innført et ITQ-system i 2009. I Finland og på Åland er fiske på statens allmenne havområde i prinsippet fritt innenfor den nasjonale kvoten som tildeles av EU. Selv om Rådet har blitt enig om at omsettelige konsesjoner fortsatt bør være frivillig har temaet ført til at også Sverige og Finland vurderer et system for omsettelige kvoter.

Det kan i det hele tatt synes som at det å gi fiskerne rettigheter til kvoter og dermed et eierforhold til ressursene er et felles virkemiddel for å ivareta lønnsomhet og hindre overfiske. Dette er imidlertid ikke hele bildet. Færøyene er det eneste landet i Norden som har erstattet et kvotesystem med innsatsregulering. TAC-regimet med tilhørende kvoter ble innført etter Færøyenes økonomiske krise på 1990-tallet. Systemet manglet imidlertid legitimitet, særlig i bunnfiskfiskeriet i færøyske farvann, og ble derfor erstattet med et fiskedagssystem i 1996. De andre fiskeriene, samt fiskerier i andre lands soner, er fortsatt regulert gjennom kvoter. Bunnfiske i færøyske farvann er et blandingsfiskeri. Ved å regulere antall dager istedenfor mengde for dette fiskeriet er hele fangsten legitim og har økonomisk verdi. På denne måten sikrer fiskedagsystemet at man ikke får problemene med utkast og underrapportering som TAC-forvaltninger utfordres av. For å ivareta hensynet til bærekraft og lønnsomhet vurderes det samlede antall fiskedager hvert år og fastsettes av Lagtinget etter en omfattende rådgivnings- og høringsrunde. Styrken med fiskedagsystemet er at det har bred støtte og legitimitet i befolkningen. Det anerkjennes at kvaliteten på rettighetene kanskje ikke er like god som ved kvoteregulering, men får aksept fordi det synes å fungere, særlig fra et næringsperspektiv. Siden 1996 har totaldager gradvis blitt redusert for å ta hensyn til økt effektivitet i flåten.

Også på Island, som sammen med New Zealand var en pioner i utvikling av ITQs, er systemet gjenstand for stor debatt, særlig etter finanskrisen som nevnt ovenfor. I tillegg til den innførte ressursskatten debat-

teres det en lovendring, slik at myndighetene får adgang til å tidsbegrense og reallokere kvoter. Denne lovendringen er foreløpig ikke vedtatt. Erfaringene fra Island og Færøyene viser at selv om eierforhold til ressursene og omsettelige kvoterettigheter kan være en nyttig måte å regulere fangsten på, er den spesifikke utformingen av slike ordninger viktig, og de er heller ikke den eneste farbare vei.

Styringsstruktur

Flere av de nordiske landene har gjort endringer i sin styringsstruktur. På Island har det tidligere Fiskeri- og landbruksdepartementet blitt slått sammen med Nærings-, energi- og turismedepartementet og deler av Økonomi- og handelsdepartementet og utgjør etter september i år Nærings- og innovasjonsdepartementet. Det tidligere fiskeridepartementet har vært kritisert for å kun ta hensyn til fiskerinæringen, ikke til folket. Omorganiseringen av departementene skal på denne måten føre til en mer helhetlig forvaltning av det som bidrar til landets økonomiske vekst. Det er også et poeng at Det grønne partiet som nå er i regjering vil satse mer på miljø. Ved utnyttelse av naturressurser ønsker de at flere hensyn spiller inn. En konsekvens av dette er at Miljødepartementet har fått en mer sentral rolle ved fastsettelse av kvoter, hvor de er tyngre involvert i rådgivningsfasen enn tidligere.

Det er Departement for fødevarer, landbruk og fiskeri som har det øverste forvaltningsansvaret for fiskeriene i Danmark. Departementet har vært igjennom mange endringer og strukturelle forandringer. Fiskeri og landbruk ble slått sammen i 1995 og i 1996 ble dagens departement etablert. I 2007 ble sektorforskningen flyttet fra departementet til universitetene. Den siste endringen ble gjennomført 1 februar i 2012. Da ble hele underorganisasjonen delt i to store styrelser: Fødevarestyrelsen og Naturerhversstyrelsen. Naturerhversstyrelsen er en sammenslåing av det tidligere Fiskeridirektoratet, Fødevareerhvervet og Plantedirektoratet. Omorganiseringen representerer et forvaltningsparadigme der departementene skal ha en mer byråkratisk profil hvor det er aktørene som gis ansvaret for å optimalisere egen drift innenfor overordnede rammebetingelser som balanserer hensynet til natur og næring.

I 2011 gjennomførte Sverige en omfattende omorganisering av myndighetsstrukturen vedrørende fisket. Det tidligere Fiskeriverket, som sorterte under Landbruksdepartementet, ble lagt ned og forskningen ble flyttet til universitetene som nå leverer tjenester på oppdrag. Samtidig ble Hav- och vattenmyndigheten opprettet med et bredere ansvar for havmiljøet. Hav- och vattenmyndigheten er en enrådsmyndighet som innebærer att generaldirektøren selv står ansvarlig for myndighetens virksomhet ovenfor regjeringen. Formelt sett sorterer de nå under miljødepartementet. Omorganiseringen begrunnes med at man ønsker et økosystemperspektiv på forvaltningen og at dette er mer gjennomførbart ved å skille næring og administrasjon. Omorganiseringen har hatt bred støtte i den svenske befolkningen og det anses som en naturlig oppfølging av de forvaltningsverdiene landet har.

I de øvrige nordiske landene har lignende omorganiseringer på departementsnivå ikke vært aktualisert. På grunn av fiskerisektorens beskjedne betydning har fiskeriadministrasjon aldri hatt noen sterk stilling i Finland eller på Åland. Det er Fiskeri- og viltdirektoratet hos Departement for landbruk og skogbruk som har det nasjonale ansvaret for fiskeriforvaltningen i Finland, mens fiskeriforvaltningen på Åland styres av Fiskeribyrån som tilhører landskapsregjeringens næringsavdeling. I Finland har imidlertid de seks regionene hatt en omfattende forvaltningsmyndighet siden 1980-tallet. Da Finland ble med i EU ble kontrollregimet som var påkrevd gjennom den felles fiskeripolitikken konstruert på basis av denne strukturen. Kontroll og inspeksjonsoppgavene ble derfor delegert til det regionale nivået. På dette nivået har det vært en omfattende rasjonaliseringsprosess. På

1990-tallet ble fiskeriforvaltningen slått sammen med landbruk og på 2000-tallet ble disse videre slått sammen med miljø og arbeidskraft. På det regionale nivået har derfor fiskeriforvaltningen svært få ressurser til store oppgaver.

Fiskeriene i Norge administreres av Fiskeri- og kystdepartementet. Departementet er det eldste av de nordiske fiskeridepartementene og etablert allerede i 1946. Spørsmålet knyttet til havområdene berører også arbeidsområdene til olje- og energidepartementet, næringsdepartementet og miljødepartementet. Til tross for at havområdene har stadig flere interessenter med til dels motstridende verdier, har en omorganisering for å samle havspørsmålet under ett departement så langt ikke vært aktuelt. Norge har generelt et stort administrativt apparat relativt til folketallet, og effektivisering av forvaltningen har ikke gjort seg gjeldende i like stor grad som i Danmark og i Sverige. Det påpekes at selv om fiskeridepartementet ikke er integrert med de andre havrelaterte departementene så jobbes det godt med en helhetlig forvaltning som tar hensynet til mange interesser. Innad i Fiskeri- og kystdepartementet har det blitt opprettet en egen seksjon for havmiljø, hvis formål blant annet er å bringe fiskeriperspektivet inn i miljødebatten. I Norge har økosystembasert forvaltning også fått et formelt gjennomslag ved havressursloven av 2008. Loven innførte et forvaltningsprinsipp som innebærer at det er hele økosystemet som skal forvaltes.

På Færøyene og på Grønland er departementene de samme. Sektorens sterke betydning for landene gjør at dette oppfattes som en stabil og nødvendig organisering. I disse landene har ikke hensynet til miljø eller økosystembasert forvaltning endret på dette slik som på Island. Det sies at det ikke finnes organisasjoner som presser på med disse idealene, men at økosystemet likevel ivaretas på grunn av de kommersielle interessene og også på grunn av internasjonale forpliktelser. Fiskerilovgivningen i begge land er under revisjon og ordlyden i forslaget på Grønland pålegger i sterkere grad enn ført at det skal legges vekt på fiskeriets innvirkning på økosystemet.

Fra konvergens til divergens?

Det skjer store endringer i nordisk fiskeriforvaltning. Det forvaltningsregimet som ble etablert etter etableringen av økonomisk sone har blitt modent og er nå i støpeskjea. Som vist i det foregående er det særlig økt grad av markedsstyring og større fokus på økosystembasert forvaltning som preger utviklingen av fiskeriforvaltningen. På den ene siden fører disse faktorene til at nasjonale forvaltningssystemer får et mindre handlingsrom. Ved økt markedsstyring blir internasjonale endringer og utviklingen i markedet førende for hvordan sektorene må tilpasse seg. På samme måte bestemmes gjennomslagskraften til økosystembasert forvaltning i stor grad i større internasjonale fora som for eksempel Forente Nasjoners organisasjon for mat og landbruk (FAO). På den andre siden åpner utviklingstrendene opp for større grad av variasjon fordi repertoaret av forvaltningsmodeller utvides. Endringsprosessene er i så måte tvetydige; de peker både imot større grad av likhet og imot differensiering.

De nordiske landene har mange likhetstrekk. Språket er relativt likt og landene har felles kjerneverdier som likhet, lav maktdistanse og respekt for naturen (Nordisk Råd, 2005). I tillegg til at utfordringen med å etablere en nasjonal ressursforvaltning var felles og forenende for de nordiske landene, har disse likhetene trolig bidratt til at fiskeriforvaltningen har utviklet seg relativt likt. Det har vært et organisert nordisk samarbeid i fiskerispørsmål, for eksempel gjennom Nordisk råd og Nordisk ministerråd. Foraene fungerer som et slags politisk verksted, hvor landene kan diskutere med og lære av hverandre. Dette er ikke det samme som at landene alltid har vært enige. Det er åtte svært forskjellige land med ulike fiskerisektorer, både historisk, sosialt, økonomisk og i biologisk forstand. Selv om

samarbeidet har vært godt, har fiskeripolitikken aldri vært lik. På grunnlag av dette kan det argumenteres for at de endringene som skjer i fiskeriforvaltningen representerer en kontinuitet i Norden. Alle landene er opptatt av spørsmål som lønnsomhet, restrukturering, ressursskatt, bærekraft og bosetningsspørsmål. Alle landene opplever den samme påvirkningen, de samme trendene. Det har alltid vært land som har vært tidligere ute enn andre med nye initiativer. For eksempel innførte Island individuelle kvoter lenge før de andre nordiske landene. Ulikhetene i de endringene som nå skjer kan derfor være en kortvarig utakt der landene på nytt vil harmoniseres på sikt. Dette kan også underbygges med reformen i EU. Dersom den vedtas slik det er foreslått vil medlemslandene sin ressursforvaltning trolig ble mer lik enn den er i dag. Det er ingen tvil om at reformen henter inspirasjon fra de nordiske ikke-EU-landene i tillegg til sine egne fiskerinasjoner.

Der det tidligere har vært likhetene mellom landene som har dominert utviklingen av de nasjonale fiskeriforvaltningene, blir imidlertid ulikhetene nå mer framtredende. De nordiske fiskeriforvaltningene utvikler seg i ulike retninger, med ulike sosialpolitiske tiltak, ulike oppfatninger om ressursforvaltningsmodeller og ulike måter å reorganisere forvaltningsstrukturen på. De nordiske landene har tatt forskjellige valg i det repertoaret av forvaltningsløsninger som økt markedsstyring og økt fokus på økosystembasert forvaltning introduserer. Dette skyldes at landene i varierende grad er følsomme for de utfordringene regimeendringene fører med seg. I Vest-Norden, hvor fiskeri er en betydelig økonomisk faktor, har de strukturendringene økt markedsstyring fører med seg gjort næringen mer kompakt, samtidig som det politiske og samfunnsmessige nedslagsfeltet blir mindre. Dette har ført til at den næringsmessige dimensjonen i forvaltningen har blitt mer framtredende. Lønnsomhet og fordeling av overskudd blir fokus for forvaltningen fordi det har avgjørende betydning for landenes økonomiske framtid. I Øst-Norden, hvor det fins flere ben å stå på i nasjonaløkonomisk forstand, har strukturendringene og mindre næringer ført til at andre sider ved fisket, slik som rekreasjon og hensynet til miljøet, har blitt mer dominerende. Tydeligere enn noen gang kan de nordiske lands fiskeripolitikk på denne måten karakteriseres i forhold til hverandre: I Finland og på Åland er fiske først og fremst rekreasjon. I Sverige er det et miljøspørsmål. I Danmark og Norge er fiskeri først og fremst næring, men i Norge er det stadig elementer av en distriktspolitisk profil. På Færøyene og Grønland er fiskeriene mer enn næring, de er selve ryggraden i landenes økonomi, mens på Island har fiskeri blitt finans. Slike brede karakteristikker viser selvsagt ikke hele bildet. Men de viser at de mange interessene i fiskeriforvaltning har forskjellig rangering i de ulike landene.

Forskjellene blir enda tydeligere når det gjøres formelle endringer for hva fiskeriforvaltningen skal være, for eksempel i forbindelse med omorganisering av departementsstrukturer. I bevegelsen vekk fra en tradisjonell fiskerisektor må det defineres på nytt hva fiskeriene skal forvaltes som. Bør det være et næringsdepartement? Et departement for naturressurser? Eller skal fiskeri defineres som en del av miljødepartementet? Organiseringen av forvaltning representerer på denne måten en autorisering av fiskeripolitiske verdier, det innebærer en grensedragning for hva som hører sammen med hva og hvilke interesser som får dominere problemforståelse og løsningsmodeller i sektoren. Den interessekoalisjonen som får gjennomslag og autoriseres ved at sektoren gis en bestemt form virker konsoliderende i sektorens videre utvikling: institusjonalisering virker selvforsterkende. At de nordiske landene har valgt ulike løsninger på dette taler for at fiskeriforvaltningen kommer til å fortsette å utvikle seg på ulike måter.

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Marine Policy

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Contesting the social contracts underpinning fisheries—Lessons from Norway, Iceland and Greenland

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Highlights

- The societal value of fisheries can be understood by changes in the social contract.
- The social contract underpins legal and institutional practices and vice versa.
- Social contracts in fisheries have been gradually contested by new access-regimes.
- Market-based approaches are changing fisheries, but social contracts are resistant.

Abstract

It has been noted that in general, formal objectives for fisheries management policies, as expressed in sector legislation, are multiple and inconsistent and that as such they are poor guides for deciding and evaluating management interventions. While we acknowledge that the explicit value statements in legal texts may be unclear and symbolic, it underestimates the possibility of reading out, from legal prescripts and the institutionalised practices they support, the values and concerns a society holds the fisheries sector accountable for. In this study, we examine trends and changes in the value that fisheries hold to Nordic welfare societies. With the concept of 'social contract in fisheries' as a frame drawing on examples from Norway, Iceland and Greenland to examine how the societal value of fisheries is reflected in existing prescripts and practices, how these are currently being contested, and whether the social contract is undergoing change along the way.

Keywords

Nordic fisheries policy; Sustainability; Social contract; ITQ; Commons; Societal value

< Praktisk økonomi & finans 02 / 2014

Bedrift og virkemiddel – om den nordnorske fiskeindustrien med trålere

av **Edgar Henriksen**

Side: 130-142

Sammendrag

På nyåret i 2014 rapporterte pressen om opprør i en rekke kystsamfunn langs Finnmarkskysten. Det toppet seg med en markering foran Stortinget. Opprøret ble utløst av at de Aker-eide fiskeriselskapene (Norway Seafoods og Havfisk ASA) signaliserte at de ville rasjonalisere produksjonen av hvitfiskfilet. Opprøret ble dels rettet mot selskapets ledelse, men også mot staten ved Nærings- og Fiskeridepartementet som har signalisert endring i offentlige krav til hvor råstoff fra konsernets trålere skal leveres og produseres. I denne artikkelen vil vi gå igjennom bakgrunnen for opprøret og diskutere filetbedriftenes status som distriktspolitisk virkemiddel.

Nøkkelord: kystopprør, bedrift som virkemiddel, strategisk handlingsrom, statlig intervensjon, korporativ relikt

https://www.idunn.no/pof/2014/02/bedrift_og_virkemiddel_om_den_nordnorske_fiskeindustrien_

Hasvik og Riston-modellen: En studie av innovative løsninger på problematikk knyttet til trålernes leveringspliktavtale.

Dato

2015-05-15

Type

Master thesis
Mastergradsoppgave

Forfatter

Sørdahl, Patrick Berg

Sammendrag

Deler av norsk fiskerinæring og fiskeriavhengige kommuner står i dag ovenfor en situasjon hvor man i større grad enn tidligere konfronteres med motstridende hensyn relatert til sosial-, økonomisk- og økologisk bærekraft. Mer spesifikt står norsk trålnæring i skjæringsfeltet mellom dens tradisjonelle rolle som en sesongutjevnende råstoffleverandør til lokal industri, og dens rolle som en konkurransedyktig eksportnæring i et skiftende og globalisert marked, to hensyn som vanskelig komplementerer hverandre. I Hasvik kommune i Vest-Finnmark var det lenge en leveringsavtale fra kysttråleren Riston som hadde fått tildelt kvoter mot å tilføre råstoff til kommunens fiskeindustri. Ved at denne avtalen ble brutt fra rederiets side gikk kommunenes ledelse i forhandlinger med rederiet for å oppnå en kompensasjon i form av et fond, noe kommunen lyktes med. Gjennom en studie av "Riston-fondet" i Hasvik kommune viser jeg hvordan nye avtaler mellom det kommunale, statlige og private er med på å skape et nytt mulighetsrom for aktørene. Studien av Riston-prosessen i Hasvik har vist betydningen av en omstillingsorientert og næringsmessig kompetent kommunal ledelse. Jeg argumenterer for at i en næring i endring trenger man en økt grad av fleksibilitet og omstillingsdyktighet for å dermed være bedre rustet til å imøtekomme framtidige utfordringer. Som et ledd i dette er det også nødvendig å ta et oppgjør med de forventningene man har til norsk fiskeindustri, forventninger som ble skapt under andre forhold enn de man ser i dag.

Forlag

UiT Norges arktiske universitet
UiT The Arctic University of Norway

Felles fjord - ulik fremtid? En komparativ stedsstudie av to tilsynelatende like fiskerisamfunn på vei i hver sin retning.

Permanent lenke

http://hdl.handle.net/10037/6468

Åpne

thesis.pdf (6.215Mb)
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2014-05-15

Type

Master thesis
Mastergradsoppgave

Forfatter

Tjosaas, Sissel

Sammendrag

Denne studien tar for seg stedsutvikling for fiskeriavhengige lokalsamfunn i lys av fremtidsutsiktene for de marine næringene i nord. Sammenligningen av Fjordgård og Husøy baserer seg på et relasjonelt og prosessuelt stedssyn, der stedsutvikling skjer på grunnlag av både lokale og globale stedsinteresser, stedsbilder og stedsbruk. Studien bidrar til å utvide stedsforståelsen ved å peke på stedsdynamikken som oppstår ved høsting av fisk som levende naturressurs. Husøy og Fjordgård har mange fellesstrekk men befinnner seg likevel i hver sine utvilklingsbaner. For å finne årsaken til dette anvendes forskning som bidrar med mestringsstrategier, i møte med stedsdynamikk. Studien avdekker at det stedlige fellesskaplige engasjementet blir hemmet som driver for stedsutvikling, dersom det ikke foregår i samspill med fiskebruket. Samspillet viser seg å være avhengig av at eierne av fiskebrukene ser virksomheten som gjensidig avhengig av det stedet det er lokalisert. Samspillet har dårlige kår dersom eierne ser virksomheten uavhengig av stedstilknytningen. Studien avdekker at samspillet mellom flåten, befolkningen og fiskebruket, samt mange og ulike nettverkskoblinger, ser ut til å være nøkkelen stedsutvikling i fiskeriavhengige samfunn.

Forlag

UiT Norges arktiske universitet
UiT The Arctic University of Norway

Strategisk tilpasning

Do fluctuations in input impact industry structure?

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Abstract in Norwegian:
Denne artikkelen retter oppmerksomheten mot om, og hvordan usikkerhet knyttet til en råvare påvirker industristrukturen blant de bedriftene som lever av å bearbeide råvaren. Produksjon av tre ulike råvarer i norsk matvaresektor studeres; melk, oppdrettslaks og villfanget torsk. Ulike dimensjoner ved industristruktur som grad offentlig engasjement, transaksjonskostnader, konsentrasjon og bedriftsmangfold, studeres.

De empiriske funnene som rapporteres bekrefter på mange områder de forventningene som teoretiske modeller gir. Samtidig er noen resultater mer overraskende. Implikasjonene av funnene, både næringsmessige og teoretiske, drøftes i slutten av artikkelen.

Abstract in English:
This paper addresses whether and how variations in input may impact industry structure. Three Norwegian industries producing fresh food from different biological sources are analysed. The products under scrutiny are milk, farmed salmon and wild caught cod. The industries are compared in terms of input variations, public involvement, transaction costs, concentration and degree of firm heterogeneity.

The empirical findings reported both confirm and contradict predictions from theory, which are explained and discussed. Implications are highlighted.

Key words: Input uncertainty, transaction costs, firm heterogeneity and concentration rate

Introduction

The structure of the industry in which a firm operates is believed to be of key importance for its choice of strategy and profit potential. Porter (1980, p.3) claims that the *"industry structure has a strong influence in determining the competitive rules of the game as well as the strategies potentially available to the firm"*. However, industry structure not only varies across industries, but also over time. A variety of factors may impact industries and their structures. For example, man-made technological breakthroughs can cause dramatic industry structure changes or even give rise to new industries (see e.g. Tushman & Anderson, 1986). Also, industry structure is affected by changes in adjacent stages in the value system/chain and the bargaining power of suppliers and customers. Firms' actions and pursued strategies may as well influence the structure and thus the profit potential and competitive position for actors operating in the industry. Other important factors are scale and scope economies, capital requirements needed to operate in the actual industry, prevailing ideologies and governmental policies. Hence, factors that may impact industries and their structure are multiple. For a comprehensive overview of such factors see Porter (1980) and Besanko *et al.* (2004).

In this paper we ask whether unpredictable fluctuations in supply may also impact industry structure. This question is im-

portant – at least due to the following two reasons: First, even though fluctuations, which relate to uncertainty, have extensively been dealt with in a variety of disciplines – such as economics, strategy and organisation science – fluctuations – or uncertainty – have to the best of our knowledge only to a limited extent been related to industry structure. For example, in Porter's (1980) extensive discussion of industry structure, this factor is not mentioned at all and in standard industrial organisation textbooks such considerations are also neglected (see e.g. Sheperd, 1997). Further, in order to operate effectively, adequate and timely supply of inputs is needed. In very much of strategy and marketing literature, adequate and timely supply is implicitly seen as unproblematic – and hardly dealt with at all. Challenges related to supply are instead left to sub-disciplines such as logistics and supply management (Ottesen & Grønhaug, 2002). In some industries, such as the fish processing industry, central input factors are nature-based raw materials where the control potential over supply is highly limited.

The remaining part of this paper proceeds as follows. In the next section we first define and clarify the central concepts to be applied. We do so to better grasp and cope with the research problem under scrutiny. Our effort to define and clarify central concepts – in particular our dependent variable "industry structure" – is theory-based, drawing on elements from economics in general, and especially from the field of industrial organisation. As part of our attempt to describe and predict whether and how uncertainty may impact industry structure, we develop a set of interrelated theory-based hypotheses where also transaction cost economics principles are utilised.

To examine our research problem empirically we collected detailed data to adequately describe and contrast three industries, all producing fresh food. The central inputs in the three industries are milk, farmed salmon and wild caught cod respectively. The three industries were selected due to varying degree of fluctuations related to – or uncertainty enveloping –the central biological input applied. To reduce the potential impact of other influencing factors, the three industries were selected as similar as possible, i.e. they all produce fresh food, production is in all three cases based on biological raw material sources, and they are all situated beneath the umbrella of the Norwegian superior legislative and political framework.

Based on detailed mapping of the three industries we report our findings, which take form of presenting the characteristics of the three industries along derived dimensions related to input uncertainty and political involvement. We then continue by reporting our empirical findings related to the hypotheses proposed. Our conclusions partly challenge and complement existing theories on how input uncertainty affects industry structure. Alternative explanations are proposed for unexpected (deviating) observations. At last we draw and discuss implications.

Central concepts and hypotheses

This section starts by defining and clarifying the central concepts we apply to grasp and cope with the stated research problem. We do so because how concepts are defined impact what aspects of, and thus how, the actual problem is captured. After this we advance a set of interrelated hypotheses on how our independent variable, input fluctuations – or maybe more precisely – input uncertainty might impact on our dependent variable, i.e. industry structure.

Basic concepts

The concepts "industry" and "industry structure" are related. However, the concepts are often applied differently – and frequently left undefined. The notion of an industry, for example, often refers to products (e.g. the seafood industry), countries, or central inputs and technologies applied. A more

useful definition to capture the importance for competition and strategy is probably the following: *"…the group of firms producing products that are close substitutes for each other"* (Porter, 1980, p. 5). To what extent products substitutes each other relates to the inter-competition between them and can numerically be captured by measuring their cross-price elasticises of demand.

"Industry structure" relates to central aspects or characteristics of an industry. What aspects to emphasise, depend on purpose. For example, the often applied characteristic "concentration", e.g. as captured by the aggregate market share of the largest firms, is often used to indicate the intensity of competition in the industry. In this research we are – in particular – preoccupied with whether and how uncertainty may influence and restrict actors and their coping – and how this may be reflected in the way they organise their activities. Thus, we address characteristic of particular relevance for this purpose. For example, in addition to traditional measures, such as numbers of sellers and buyers, and concentration, input fluctuations or uncertainty may impact the possibilities of standardisation, investment risks, and thus the ability to pursue economies of scale.

Further, if fluctuations relate to variability in type and quality of input, this may influence the possibility for exploitation of economies of scope. Input uncertainty may also impact the potential inclusion of subsequent activities in the value system, or the acquisition of upstream units, hence, the degree of vertical integration. An important question is also whether uncertainty impacts how firms perform their transactions, including activities to secure inputs and exchange their outputs. Transactions are contract-based. An important question is whether input uncertainty impacts ability for monitoring inputs prior to purchase –a prerequisite in order to design contracts effectively.

As stated above our independent variable is input uncertainty. The concept of uncertainty has been applied in various ways. According to Knight's (1921) classical definition, uncertainty is present when actors can not assign well-defined probabilities to possible outcomes. If they can, it is the case of risk. The importance of uncertainty is underlined by Coase (1937, p. 338) who find it *"…improbable that a firm would emerge without the existence of uncertainty,"* since short-term contracts are unsatisfactory under these circumstances.

The research literature distinguishes between different sources or types of uncertainty, e.g. between primary, secondary, and behavioural uncertainty (Williamson, 1989) or primary, competitive or supplier uncertainty (Sutcliffe & Zaheer, 1998). The type of uncertainty under scrutiny here – given the biological production processes in question – is primary uncertainty – i.e. uncertainty related to state of nature. Primary uncertainty stems from random events of nature, unpredictable changes, change in consumer preferences, and regulatory- or technological changes that are difficult to predict. In this paper we distinguish between input uncertainty related both to quality and volume of supply.

Before we develop our hypotheses we briefly discuss how public involvement may moderate the impact of uncertainty on industry structure.

The moderating influence of public involvement

Firms and industries do not operate in a political vacuum. Review of the literature on industry structure reveals that public involvement may heavily moderate the structure and development of industries in several ways (Viscusi *et al*., 2005). Public authorities all over the world struggle to protect consumers from monopolies' opportunistic actions. Antitrust legislation, aiming at hindering firms from harmfully exercising a dominating market position, is now implemented in most western countries. At the same time, public authorities implement protective measures (like tariffs and import quotas) to shield domestic industries from

global competition. Well positioned nations argue for free trade, while nations in weak competitive positions argue for arrangements aiming to protect domestic industry. It should also be noted that WTO struggles to create a global set of rules for international food trade – in which two of the three industries in our study are participating.

Public involvement also includes market intervention pursuing multiple domestic policy goals, such as levelling income among primary producers, improving consumers' welfare, supporting a sustainable rural population, and multifunctional farming. These objectives are especially pertinent among the food producing sectors which often are linked with non-industrial public policy goals. Various means are applied in this effort, such as regulating terms of trade by exclusive dealerships and rules of negotiations, directing producer subsidies, laws that guarantee or restrict market competition, income schemes, barriers of international trade and price guarantees. Also, public involvement can have both intended and unintended effects on contractual relationships and industrial structure.

Here, public involvement is understood as institutionalisation of markets (Guseva & Rona-Tas, 2001) or direct intervention in some favoured industrial sectors – either by subsidisation or protective measures. In terms of contractual relations, institutionalisation is interesting in two respects. First, institutionalisation may influence industrial structure. For example, public intervention could imply sustaining a heterogeneous structure in one industry, while imposing a homogenous structure in others. Secondly, institutionalisation may also act as a risk absorbing mechanism, since economic actors can be protected from the "court of the market" in terms of for example price guarantees or mandatory contract schemes. Similar to hierarchy, institutionalisation reduces uncertainty and transaction costs. The effects should, however, be regarded as highly dependant upon sector specific goals that may vary over time and across industries.

Influencing factors and tentative hypotheses

In this section we address factors that may influence industry structure, why they do so, and how. Regarding the factors addressed we also advance – based on theory – a set of interrelated hypotheses. The conceptual and theoretical bases of the hypotheses are: transaction cost economics, vertical integration, economies of scale and scope and concentration ratio, as well as the moderating role of governmental interventions.

Uncertainty and transaction costs economics

Transaction costs are the costs associated with searching for exchange partners, negotiating, monitoring and enforcing contractual arrangements. When the transaction environment is characterised by high uncertainty, transaction costs, *ceteris paribus*, tend to increase. Transaction cost economics (TCE) – with central proponents such as Coase (1937) and Williamson (1975; 1985) – has demonstrated to be useful to explain under which organisational forms exchanges between transaction partners – in adjacent stages in the value system – should take place (Shelanski & Klein, 1995; Vannoni, 2002). In some cases the market interface is replaced by common ownership, i.e. vertical integration, which – if adapted to a large degree – has great bearing on industry structure. TCE maintains the actual transaction as the unit of analysis, and is not preoccupied with industry structure as such. However, the cumulative effect of individual firm behaviour will of course affect industry settings on an aggregate level.

Asset specificity is the main factor of importance for choice of governance structure within TCE (Williamson, 1986), and can be defined as the tailoring of resources for specific needs. When assets are committed

to specific tasks, redeployment to alternative usages implies surrendering large amounts of their productive value. The investments undertaken by transaction partners in advance of an exchange determine the level of asset specificity, which can take many dimensions. Examples can be site specificity (location), physical (machinery) and human (training, experience) asset specificity as well as temporal asset specificity which can be substantial when the exchange involves highly perishable food products. Under the presence of high asset specificity uncertainty becomes a significant determinant for vertical integration (Sutcliffe & Zaheer, 1998) due to the possibility for hold-up and quasi rent extraction (Klein *et al.*, 1978). Vertical integration then becomes a viable option to protect firms from unforeseen contingencies or contract partners' opportunistic behaviour.

Uncertainty can further serve as a barrier for potential entrants if they do not possess the market and industry knowledge of industry incumbents (Sheperd, 1997). When industry members integrate vertically, foreclosure of input sources or product outlets might be result and potential entrants confronts higher uncertainty levels. For the incumbents, however, the integration of adjacent stages within the firm boarders, alleviate uncertain contingencies, and – as accentuated by Davies (1987, p. 95) *"…the desire to avoid or ameliorate uncertainty lies at the heart of many motives for integration."* Uncertainty related to upstream product quality (Silver, 1984), input price (Arrow, 1975) and final demand (Carlton, 1979) are some sources of uncertainty that may motivate vertical integration.

The quality of an input may from nature be uncertain. If monitoring is costly – or only possible *ex-post* – upstream integration and self production may be preferred to check the quality closer. Arrow (1975) addresses information asymmetry and argues that when the input supply is uncertain, integrating backwards can improve downstream firms' ability to forecast the input price and thereby make a better input-mix decision.

Carlton (1979) addresses uncertainty in downstream demand and claims that when it appears in situations with upstream supply rigidities, backwards vertical integration can reduce costs. This follows from the assumption that upstream producers must make their own pricing decisions before downstream demand and the derived demand for their product is known. When confronted with the risk of having unsold stocks, input prices are set above marginal production costs. Then, if the downstream producer integrates upstream, inputs can be obtained at cost. However, the risk is transferred downstream. The downstream producer can produce at a relatively low level where "…*the integrated firm is able to satisfy the high probability demand by itself, and pass on the low probability demand to some other firm*." (Carlton,1979, p. 207). Hence, vertical integration can reduce uncertainties in the firm's marketplaces regarding future price movements, supply reliability or access. Thus, according to literature we predict transaction costs to rise as uncertainty related to input rises and hypothesis:

> *H_1: High degree of input uncertainty imposes high transaction costs and hierarchical contract relations*

However, when authorities intervene in upstream markets, for instance by setting the terms of trade or by assigning legislative rights to some of the contractual partners, the distribution of bargaining power between stages might be disturbed and input uncertainties resolved. Hence, high degree of public involvement in some industries can reduce transaction costs.

Uncertainty and economies of scale and scope

Economies of scale are realised from operational efficiencies, where the unit cost falls with increased production. Scale economies are the natural cause of monopolies

when the market size is within the range of the cost effective scale of one firm. The degree of specialisation, division of labour, technological and/or financial reasons (supply quantity discount) are the reasons for the falling part of the long run average cost (LAC) function, which in turn is responsible for economies of scale. Management limitations and "diseconomies of scale" are the reasons for the upward sloping part of the LAC-curve from some output volume.

When firms become more capital intensive they tend to increase in size, since high fixed costs (specialised production technology) should be spread over larger volumes of output to reduce average costs. Technological progress encourages specialisation and substitution of capital for labour – therefore larger firms. When production is labour-intensive and fixed costs are low, firms need not be penalised for being small.

Stigler (1951) explains the degree of vertical integration in an industry by its age, since specialisation increases as markets expand and specialisation leads to efficiency since more is produced per unit of input. He argues that the size of the downstream market will influence the level of vertical integration in an industry, which will decrease as markets expand and industries mature. In young industries firms will be more apt to integrate upstream since raw material providers tend to be unable to satisfy the producer's demand when downstream markets grow rapidly. As an industry matures, upstream firms tend efficiently to supply the downstream industry. Also, as specialisation increase, input markets become reliable and vertical integration declines. As the focal industry grows old and declines, upstream market might diminish and vertical integration might again become necessary to secure the inputs needed.

Harrigan (1984) opposes this view, and posits that firm's level of vertical integration over the life-span will take an inverted U-shape, since less vertical integration should be favoured early and late in the industry's evolution due to the risks of demand uncertainty and differing needs to prove a new product's worth. These factors call for lower level of integration since the market penalty from misalignment will be great. However, she makes one exception – for pioneering firms – and asserts that technological leaders in an industry will be more integrated than their followers. The arguments of Stigler and Harrigan are adverse in the meaning that while Harrigan addresses vertical integration as a firm level phenomenon, Stigler's point of view is that from the industry level. Accordingly, their dispute seems to belong to the traditional debate on whether performance effects stem from firm or industry factors as addressed by Hawawini *et al.*, 2003.

Vertical integration should induce a downward shift in the firm's LAC curve, and increase economic efficiency. Then cost benefits can be achieved by production economies (e.g. reduced transport costs), co-ordination economies (e.g. reduced transaction or advertising costs), managerial economies (e.g. single supervision source) or financial economies (e.g. quantity discounts, reduced interest costs).

Input uncertainty may impede the realisation of scale economies. The utilisation of input specific production equipment – that can bring about (further) operational efficiencies – assumes that inputs are of homogeneous kind and supplied in sufficient quantities. Scope economies follow from the advantages from producing several outputs (from the same input) together, rather than by separate firms, and are decisive for the firm's product mix. The diversification of outputs (scope) influence on costs is measured by cost savings due to simultaneous relative to separate production. However, the occurrence of multi-output production within a single multi-product firm instead of separate single product firms requires that it is difficult to trade common inputs across markets, i.e. transaction costs are present (Teece, 1982). If not, the diversification incentives

disappear. Teece claims that when transaction costs prevents efficient market exchanges the profit maximising firm will choose multi-product diversification. Levy & Haber (1986) also show convincingly how multi-product firms benefit from flexibility due to the ability to shift inputs and/or organisational assets to other, "higher value" usages when demand uncertainty is present.

In the view of Porter (1996, p. 70) strategy is making trade-offs which also includes deciding what *not* to do. Flexibility then, as an argument related to scope economies, becomes a response to environmental uncertainty (Tannous & Mangiameli, 1993; Olhager & Rudberg, 2003) since firms' ability to change to variations in the business environment becomes valuable. Baumol (1959) also asserts that uncertainty will lead firms to under-invest in specific equipment. This implies that use of production facilities, whose scale of operation is flexible, will increase. Hill & Hoskisson (1987) further claim that environmental uncertainty places a premium on flexibility, where vertical integration might induce inflexibility and poor responsiveness. Based on the above discussion we hypothesise that:

H_{2A}: High degree of input uncertainty favour economies of scope

H_{2B}: and correlates positively with firm heterogeneity

However, public involvement may impact actors and industry structure. Authorities, in their quest for consumer benefits, usually limit large firms' access to monopolistic pricing behaviour. Hence, in industries where public involvement is high, concentration ratios tend to be reduced. Also food safety issues and legislative measures related to them might hinder firms from efficiently utilise economies of scope and thus foster firm homogeneity.

Uncertainty and firm concentration ratio

Industries differ with respect to degree of concentration. Due to factors such as entry barriers and scale economies, high capital requirement is often the case, which can also result in high sunk costs: constituting a considerable *exit* barrier if production technologies are highly specialised and where production equipment and facilities receive low salvage value. Location, input distributor scarcity, and legal reasons can as well influence entry barriers. Governmental authorities can also to some extent influence the concentration ratio in an industry for instance by antitrust laws or by the attitude and behaviour towards the 'openness' of the economy.

Antitrust laws may also limit the extent of horizontal and vertical integration, while the international linkages of an industry affect the market size, and hence, the room for action. Concentration effects can also be achieved by vertical integration, especially if it enables the acquiring firm to foreclose competitors from the upstream market. However, when supply is characterised by primary uncertainty, firm's ability to obtain scale – or other – economies from vertical integration, is limited. Uncertainty surrounding the inputs will function in the same ways as when raw material sources are scarce and no one have obtained specific control over these. Then, actors will be reluctant to undertake specific investments needed for efficient production scales, since supply volumes might be insufficient to provide effective capital utilisation. Thus we hypothesise:

H_3: High degree of input uncertainty favours low firm concentration ratio

However, industries situated under the wings of protective governments, whose purpose is to shield them from global competition, or when legislative monopoly rights are granted, industry structure is expected to be more concentrated than otherwise.

Research Method

To examine the stated hypotheses we chose to study the structure of three different industries. The industries included are all producing highly perishable fresh food and located in Norway. Fresh food is chosen because raw material quality is essential for product differentiation. Additionally, the raw material is based on biological production/harvesting which is sensitive for climate conditions and supply often takes a seasonal nature. This lead to variation in input volumes and quality. Distribution of fresh food is especially demanding, as product quality depends on a short time span between production and consumption.

To add variation to our dependent variable – input uncertainty – we chose to study three different products; milk, wild caught cod and farmed salmon. We also chose to study the industry structure in the part of the value system that processes the biological raw material. The industries chosen also allow for capturing how public involvement may impact on industry structure.

The data collected for our study is based on the need created by our hypotheses requiring information (data) about input uncertainty, public involvement, transaction costs, concentration and firm heterogeneity. To capture input uncertainty we have measured degree of input standardisation, input volume variation and input price variation.

Public involvement has been captured by degree of globalisation in both input and output markets as well as degree of national protection both related to subsidises and in terms of trade.

Transaction costs in the market interfaces have been captured by the degree of vertical integration between raw material production and processing, and terms of trade, i.e. widespread/utilisation of auctions and contracts.

Degree of heterogeneity has been captured by firm variation in term of size, product mix and degree of specialisation. We have also assessed the degree to whether competitive advantages among firms within the same industry are based on economies of scale or scope.

To capture degree of firm concentration we have measured concentration rate, together with number of buyers and number of sellers.

Findings

Below we report the findings from our investigation. To ease the presentation the variables studied are dichotomized in to dimensions like high/low or global/national. The findings are presented by comparing the relative values of the included categories (variables) in the three selected industries. The presentation of findings follows the order of hypotheses. We start by presenting our findings related to degree of input uncertainty and public involvement.

Input uncertainty and public involvement

As discussed above, it is assumed that degree of input uncertainty may impact the industry structure in several ways. It is also assumed that public involvement may moderate the way input uncertainty impact industry structure.

Table 1 shows our findings related to input uncertainty and public involvement in the three industries studied.

Inspection of Table 1 reveals that the degree of input uncertainty varies across the industries studied. In the processing industries based on agriculture and aquaculture, i.e. milk and farmed salmon, input uncertainty is low in the sourcing environment. The processing industry based on wild cod is, however, exposed to high degree of input uncertainty due to factors such as weather conditions, variations in catch rates and biological migration. Inspections

of Table 1 also show that this is the case when considering all of our exploratory variables; variation in quality (i.e. standardisation of input), volume and price variation.

Table 1 also shows that public involvement is greater in the agricultural, i.e. the dairy industry, than in the marine sector, i.e. wild caught cod and farmed salmon. In Norway, agriculture is strictly protected from global competition – including import protection from products and inputs produced abroad, subsidies aimed at increasing the profitability within the industry, as well as laws instructing the organisation of the industry and the level of prices in the input markets for agriculture products. Thus, all milk consumed in Norway is produced domestically. In the marine sector public involvement is very low – both in the farmed salmon industry and in wild caught cod industry. Apart from agriculture, the terms of trade are set by international markets. Since early 1990's there have been no subsidies directed to the marine sector. Accordingly, most of the farmed salmon and wild cod are sold and consumed abroad. As such, the three industries studied show variations both on the independent variable, i.e. input uncertainty, and the moderating variable, i.e. public involvement.

Table 1 Input uncertainty and public involvement in three Norwegian food industries

Construct	*Variable*	*Milk*	*Salmon*	*Cod*
Input uncertainty	Standardisation of input	High	High	Low
	Volume variation	Low	Low	High
	Input price variation	Low	Medium	High
Public involvement	Competition input market	Low	High	High
	Competition output market	Low	High	High
	Globalisation output market	National	Global	Global
	Globalisation input market	National	Global	Global
	National protection	High	Low	Low

Input uncertainty and transaction costs

According to our first hypothesis (H_1) the level of input uncertainty should impact transaction costs positively. In Table 2 we have summarised our findings related to transaction costs.

Inspections of Table 2 reveal that the findings are in accordance with the hypothesis. The highest transaction costs are found in the raw material market for wild caught cod, where the input uncertainty is highest.

The lowest transaction costs are found in the dairy industry, where the input uncertainty is the lowest. Transaction costs are also low in the market for farmed salmon and close to those of the dairy industry. Inspection of Table 2 indicates that transaction costs are driven by different aspects of input uncertainty. The degree of vertical integration is high in the dairy industry, where the farmers collectively own the major processing company – Tine. In spite of high degree of input standardisation of quality, market auctions are absent and monitoring unnecessary. Here long term contracts are applied to handle transactions – and minimum standards regarding the quality of the milk are employed and adhered to by farmers.

Table 2 Transaction cost in raw material markets in three Norwegian food industries

Construct	*Variable*	*Milk*	*Salmon*	*Cod*
Transaction costs	Degree of vertical integration	High	Low	Low
	Number of auctions on input	Never	Low	High
	Contracts on input	Often	Often	Seldom
	Terms of contract	Long	Short	Short
	Inspection of input before purchase	Never	Seldom	Often

Within the farmed salmon industry transaction costs are slightly higher than in the dairy industry. The degree of vertical integration at the industry level is low and most of the farmed salmon are sold to processors abroad. However, at the firm level high degree of vertical integration is partly present. Those who process farmed salmon in Norway are in general backward integrated (Isaksen *et al*, 2002, Isaksen, 2007). Farmed salmon is most frequently mediated through short term contracts or auctions. Prices are set globally and fluctuate to a higher degree than the prices for raw milk (see Table 1). Due to small quality variations, inspecting the salmon before purchases are mainly unnecessary, hence, buyer ex post monitoring costs and risks are reduced. The duration of contracts is usually on shorter terms than for milk. In the later years, commodity exchanges for salmon have emerged and functioning as financial security instruments for salmon exporters.

The industry with the highest transaction costs in our study is the wild caught cod industry. The shown variations in transaction costs reflect different aspects of input uncertainty. Due to high quality variation almost every catch need to be inspected before purchases are made. The catch is often landed directly to the buyer. Most of the catch is sold on a day-to-day basis, where price is decided after inspecting quality and volume of today's catch. Another factor that increases transaction costs in this market is that the catch often includes other species than cod. Due to input uncertainty, long term contracts are hardly ever applied. An often proposed strategy in such markets to reduce transaction costs is upstream vertical integration. Surprisingly, when comparing the three industries, we find this strategy most seldom applied in the wild caught cod industry. This may, at least partly, be explained by public involvement, since processors – according to law – are not allowed to own and operate fishing vessels. The policy goal was to establish a secure privilege for Norwegian fishermen to harvest the wild fish resources. However, some exceptions from this law have been made, where processors have been granted the right to own vessels, and the vessels must sell their catch to one specific processor or region. Several studies indicate, however, that upstream vertical integration only marginally reduces the input uncertainty in this market (Dreyer *et al.*, 2001; Isaksen *et al.*, 2002; 2004; Isaksen, 2007). The major explanation for these findings is that the way the value system is organised neither impact on climate conditions nor the way the cod migrates, and this input uncertainty remains almost the same regardless ownership in vessels.

Our findings related to public involvement are mixed. As indicated in Table 1, public involvement is the strongest in the dairy industry and lowest in the farmed salmon industry. Inspection of Table 2 reveals that transaction costs are low both in the dairy industry and salmon industry. Although the public involvement is lowest in the farmed salmon industry, the transaction costs are higher in the wild caught cod industry. Here the transaction costs are related to primary uncertainty – not under control by man – i.e. biological migration and climate, which only marginally is moderated by public involvement. In sum our observations indicate that input uncertainty impact positively on transaction costs.

Input uncertainty and scale economies

According to our stated hypothesis, input uncertainty impact on firms' ability to exploit economies of scale. We also proposed that when firms are well positioned for economies of scale, input uncertainty will impact negatively on profiting from them, while if positioned for economies of scope, the effects are indecisive or even positive. Thus, we suggest that when exposed to input uncertainty, the industry structure will develop in the direction of firm heterogeneity and product flexibility in order to respond coherently. In Table 3 we summarise our findings regarding firm heterogeneity.

Table 3 Firm heterogeneity in three Norwegian food industries

Construct	*Variable*	*Milk*	*Salmon*	*Cod*
Degree of firm heterogeneity	Firm size heterogeneity	Low	High	High
	Quality based product heterogeneity	Low	Low	High
	Product differentiation	High	Low	High
	Type of economies realisation	Scale	Scale	Scope
	Degree of specialisation	High	High	Low

A closer inspection of Table 3 shows that firm heterogeneity, i.e. size, technology, and product mix differences, are highest in the farmed salmon industry and wild caught cod industry. In particular, we find extreme heterogeneity in the wild cod industry. Looking closer at the variables related to product mix, we see that in the wild caught cod industry the mix of products is directly linked to the fluctuations in input quality. Here we also observe that firms are low in degree of specialisation and high in degree of product flexibility. Inspection of Table 3 also reveals that the well performing firms in the wild cod industry exploit economies of scope rather than economies of scale (Dreyer & Grønhaug, 2004; Dreyer, 2006, Isaksen, 2007).

In the farmed salmon industry, where input uncertainty is lower than in the wild caught cod industry, highly specialised firms tend to exploit economies of scale producing one standardised product. However, in this industry high firm heterogeneity is present in terms of variation in firm size, and also the way the value system is organised. Some firms are vertically integrated, some located abroad, and some have specialised in producing one single product. These choices relate to technology, product and capacity and are based on standardised inputs and specialisation.

The industry with the least heterogeneity is the dairy industry. Here, firms are more or less similar regarding size, technology and product mix. Firms are highly specialised and focus on economies of scale and exploitation of production capacity. When it comes to product portfolios, the dairy industry differs from farmed salmon. Here we find a wider product mix, based on milk as a standardised input combined with other inputs. The product differentiation is, however, not based on variation in input quality of raw milk, but on its application for further processing, aiming to serve various industrial customers' needs.

When it comes to public involvement, the impact on firm heterogeneity is largest in the dairy industry, focusing on an institutional framework aimed at homogeneity and exclusion of foreign competitors.

Table 4 Firm concentration rate in three Norwegian food industries

Construct	*Variable*	*Milk*	*Salmon*	*Cod*
Degree of Concentration	Concentration rate	High	Low	Low
	Number of buyers	Few	Many	Many
	Number of sellers	Many	Many	Many

Input uncertainty and concentration

In the literature degree of concentration is frequently mentioned as one of the most important dimensions related to industry structure. This is a relatively uncomplicated dimension to measure. It is also an important dimension in many theoretical models, in particular in economics and strategic management. Here we focus on how input uncertainty may impact on concentration ratio.

Our hypothesis (H_3) predicts a negative relationship between input uncertainty and firm concentration ratio. Inspection of Table 4.4 indicates support for this hypothesis. Although multiple sellers are present in all the industries studied, the industry with the highest concentration is also the one with the least input uncertainty – the dairy industry. Here we find one dominating buyer owned by the farmers. In the marine sector, i.e. firms processing farmed salmon or wild caught cod, we find low concentration ratios. We also observe that there is one way the two marine industries differ regarding degree of concentration: the farmed salmon is to a higher degree processed by firms located abroad, as farmed fish is exported unprocessed and processed in the import country. This might be explained by lower input uncertainty and lower transaction costs, resulting in a higher degree of global sourcing of farmed salmon than is the case for wild caught cod.

Again public involvement seemingly impact concentration. In the dairy industry national laws prohibit import of raw milk and milk products which contribute to a higher degree of concentration. Additionally, although firm concentration ratios are extremely high, the institutional framework in the Norwegian dairy industry contributes to, rather than prevents, high concentration rates. We believe that producers located abroad would choose to purchase their raw milk form other than Norwegian farmers if public intervention like subsidises and import protections were repealed. Thus, in an open global market degree of concentration among processors serving Norwegian consumers with milk would probably have been less. The impact on economies of scale can also lead to an opposite outcome, where the Norwegian dairy industry is merged with foreign dairy firms, like in the existing Nordic dairy firms. However, the agriculture sector in Norway has high political legitimacy open for political and regulatory intervention.

Such protective institutional tools are, however, absent in the marine sector. This sector has low public involvement and operates in an open global market and is vulnerable to protective intervention in global trade because the volumes produced are much higher than domestic consumption. In this industry public involvement is related to restriction on who is allowed to harvest how much from wild fish stocks and areas opened for farming salmon.

Concluding remarks

This study addresses how and why input uncertainty may impact industry structure. Our findings show that input uncertainty impact positively on transaction costs and firm heterogeneity. Concentration ratios, however, tends to decrease as input uncertainty increase. Additionally, our study addresses how public involvement moderates the impact of input uncertainty on industry structure. Our findings also reveal that pub-

lic involvement has an important moderating impact on industry structure. In the industries studied it was found that public involvement reduces transaction costs and firm heterogeneity, but increase concentration ratios. However, public involvement is rooted in political goals that differ from industry to industry. In this study, for instance, public involvement aiming to protect national industry from global competition, have major impact in the dairy industry. Such protective tools, however, represent a major challenge for the Norwegian seafood processing industry, if importing countries apply the same kind of protection for their own food industry.

The findings reported here have theoretical implications. According to our study input uncertainty has a potential impact on industry structure through transaction costs, firm heterogeneity and concentration rates. As noted above, this has more or less been neglected in past research. Further empirical and conceptual studies are needed in order to improve the way theoretical models should incorporate input uncertainty. Another challenge, related to a better understanding of how industry structures develop, is to study the impact of public involvement. For instance, in order to protect an industry with high political standing from global competition, tools that increase concentration ratios and restrain firm heterogeneity are utilized by authorities. On the other hand, such interventions reduce transaction costs. Public involvement is often mentioned as a factor that impact on industry structure. Our findings confirm this. However, more studies are needed in order to better understand the intended and unintended moderating impact from public involvement to include this variable into theoretical apparatus.

The reported findings also have some managerial implications. Input uncertainty affect strategy positioning at firm level. For instance, high input uncertainty seems to assign competitive advantages to firms possessing flexibility to volume and product mix. Accordingly, firms that can take advantage of standardised inputs are in a position to exploit economies of scale and specialisation strategies.

Our findings also reveal some major challenges in the three industries studied. In the Norwegian dairy industry the firm(s) is (are) vulnerable for changes in public involvement that opens for global competition. Although exploiting economies of scale today, this is hardly enough if foreign competitors were enabled to enter the Norwegian market. If so, a strategy recommended would be product differentiation rooted in input quality. However, this is not an easily adoptable strategy, since – for decades – the main strategy has been to improve and standardise input quality. This is an experience also recognised by new national actors who have tried to enter this market.

The industry experiencing the highest input uncertainty faces other challenges. In the fish processing industry utilising wild caught cod input uncertainty hassles firms. The uncertainty related to inputs, however, has created competitive advantages for those providing products based on unique input quality or having found profitable market niches. If input uncertainty is reduced, for instance through increased volumes of farmed cod, the possibility to exploit these kinds of competitive advantages will be reduced and open for radical changes in the industry utilising wild caught cod.

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Vertical Integration and Performance: Measurement Issues – and an Empirical Illustration from the Norwegian Fisheries Industry

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Abstract Norwegian:
Vertikal integrasjon er ofte utnyttet for å takle markedsproblemer og fremme bedrifters lønnsomhet. Empiriske funn fra tidligere forskning omkring lønnsomhetseffektene fra dette strategiske grepet viser imidlertid at forskjellig resultat: Positiv og negativ – så vel som betydningsløs – samvariasjon mellom vertikal integrasjon og lønnsomhet er observert og rapportert. I tillegg viser nærmere ettersyn av empiriske funn at samvariasjon mellom lønnsomhet og vertikal integrasjon varierer mellom næringer, og at forskjellige mål – både for vertikal integrasjon og lønnsomhet – har vært benyttet i tidligere empirisk forskning.

Denne artikkelen gjennomgår tidligere funn med tanke på forholdet mellom vertikal integrasjon og lønnsomhet. For å sammenlikne deres fordeler og ulemper benyttes ulike mål for oppstrøms vertikal integrasjon i den samme konteksten; norsk fiskeindustri. Et unikt datasett over paneldata fra bedrifter, som inneholder detaljert informasjon vedrørende lønnsomhet og vertikal integrasjon, benyttes. Våre funn viser at det er stor variasjon i forbindelsen mellom vertikal integrasjon og lønnsomhet, både i forhold til mål og mellom bedrifter. Avslutningsvis vurderes anvendeligheten av ulike mål for vertikal integrasjon, samtidig som implikasjoner understrekes.

Abstract English:
Vertical integration (VI) is a strategy frequently applied to overcome market imperfections and, thus, enhance firms' performance. Empirical findings from past research, however, show mixed results regarding the covariation between VI and performance, and positive, negative, and non-significant covariation has been observed. Closer inspection of empirical findings also reveals that the covariation between VI and performance varies across industries, and different measures, for both VI and performance, have been applied in past empirical research.

This paper reviews findings related to the vertical integration – performance relationship (covariation). To examine the strengths and weaknesses of various measures we control for the so-called "industry-effect" by applying various measures of upstream vertical integration in a single industry setting – the Norwegian fish processing industry. In so doing, a unique data set from a panel of firms containing detailed information about performance indicators and vertical integration is applied. Our findings show variations in the vertical integration–performance link across measures and firms. The applicability of measures is critically assessed and implications highlighted.

Keywords: Vertical integration, performance, measurement, Norwegian fisheries industry

Introduction

Vertical integration is an often addressed topic within corporate and industry strategy research. When applied under conditions characterised by market failures, (e.g. substantial transaction costs, demand variability and high market uncertainty) vertical integration is believed to create different economies and to positively influence firm performance. However, reviews of the literature reveal that the research undertaken

to empirically examine performance effects from vertical integration is limited (Bhuyan, 2002; Shelansky & Klein, 1995; Spiller, 1985). Furthermore, findings regarding the vertical integration performance effect are inconclusive. This article attempts to shed some light on this issue, as the "make-or-buy" dilemma has great practical implications for any firm, and a decision either way should be guided by robust knowledge. In studying this relationship, we carefully examine measurements applied in past research. We also empirically examine the performance of firms in one industry, where vertical integration (VI) is applied to a varying degree. More precisely, we examine the extent to which the varying degree of VI implementation in firms influences their financial performance. In addition, we focus on the problems regarding choice of measurements when testing the VI-performance relationship.

The essence of the VI phenomenon can be broken down to one economic entity's possession of successive stages in the input-throughput-output system, i.e. the value chain from raw material to consumers.[1] The obvious question is why adjacent stages of production, which could have been handled by separate firms, are managed within the boundaries of one firm? The answer is believed to be concealed in the weighted cost comparison between market exchanges and internal resources.

Several problems arise when assessing performance effects from the integration of firms into adjacent stages of the value chain. Measurement problems exist, both regarding VI and performance: How do we capture the true nature of VI on one hand and the financial performance of firms (and industries) on the other? How do we know that our findings at firm level are not a product of the industry structure in question? In this paper, we offer some suggestions for how to address these problems. We do so by employing different measurements for VI and performance, and thoroughly analyse the environment in which firms are embedded. In so doing, we report findings from a study carried out in the Norwegian fish processing industry, where the upstream VI of firms towards their raw material source was assessed and compared with the financial outcome of their businesses.

The rest of the paper is organised as follows: The next section gives a brief review of theories explaining the persistence of VI. We also provide a review of earlier empirical studies on the vertical integration-performance (VI-P) relationship. Then we present our data and the setting studied, before our analyses and results are reported. We also include a critical assessment of our findings, and highlight managerial and methodological implications as well.

Vertical Integration – approach

Vertical integration has interested researchers for decades, going back to Adam Smith and the division of labour, as advocated by Young (1928: 48), and Stigler (1951). In *neoclassic economic theory,* coordination between separate organisations is governed by a market system rather than managed internally within a firm, even in the presence of bounded rationality and opportunism. In the early work of Coase (1937), which has been revitalised and 'illuminated' by Chandler (1962) and Williamson (1971), among others, the boundaries of the firm were ascertained in light of transaction costs. The transaction costs explanation was grounded by the shortcomings of exploiting the market for allocating resources between adjacent stages in the value chain. This, in turn, gave firms motivations for 'making' instead of 'buying' and 'using' instead of 'selling'. Transaction costs were merely *"…the cost of organizing the economic system"* (Arrow, 1969: 48), or as stated: *"…there would be no reason for business firms to exist if (…) we could foresee the future perfectly and there were no costs in negotiating and renegotiating long-term contracts"* (Azzam & Pagoulatos, 1999: 10). *Transaction cost economics*

(TCE), *industrial organisation* (IO) and *strategic management* (SM) are the theoretical domains that dominate the analysis of VI, according to Chatterjee (1991).

Theories can be viewed as explanations. Here we apply elements from several theories that help illuminating and capturing the actual phenomenon. One theory alone will seldom or never be able to provide a complete explanation of VI (Joskow, 1988). As Langlois & Robertson (1989: 361) concluded in their study of VI in American automobile industry,: *"An examination of the whole history suggests that no single theory always fits the facts perfectly. A complete explanation must combine specific theories in a way that is attentive to such factors as industry life-cycle, demand, economies of scale, and appropriability."*

Transaction costs economics (TCE) has received considerable attention in efforts to explain the existence and effects of VI, and it is frequently applied to explain the outcome of the vertical structuring of production (Shelanski & Klein, 1995). TCE predicts that organising transactions internally creates economies that are profitable, as long as *"… costs of transacting over market outweigh internal costs of management"* (Levy, 1985: 439). In its 'purest' form, i.e. vertical financial ownership, VI enhances profitability, since inter-firm profit claims are eliminated (Mahoney, 1992). This "make" alternative is – in the view of TCE – the "*organization form of last resort"* (Williamson, 2008: 5).

According to *industrial organisation* (IO), the primary determinant of VI is market structure (Chatterjee, 1991) and VI can constitute a valuable instrument for creating competitive advantages, either by utilising different economies, by reducing external uncertainty, or by securing the supply of critical input (Porter, 1980). Following the IO perspective, VI should lower the risk to firms in markets with few actors and with demand and volume uncertainties, and thereby increasing profitability for those applying a VI strategy.

S*trategic management* (SM) is based on managerial and organisational practice (Rumelt *et al.*,1991) and VI is applied to ease managerial processes in situations with high uncertainty. According to Chatterjee, Lubatkin & Schoenecker (1992), however, SM has so far been the sparsest and most inconsistent one of the three streams of research explaining VI. Within SM, the resource-based view of the firm (RBV) , have improved the understanding of VI (Mahoney, 1992). RBV emphasises heterogeneous, valuable, and rare combinations of resources that give rise to "hard-to-imitate" competitive advantages (Barney, 1991; Wernerfelt, 1984). This perspective, however, gives no simple rules of thumb for *when* to integrate vertically, since for each case the actual situation must be taken into account (Balakrishnan & Wernerfelt, 1986; Barney 1991). Scholars in this field have also pointed to the possible cost disadvantages and potential fallacies when a VI strategy is wrongfully implemented (Collis & Montgomery, 1997; Stuckey & White, 1993).

The VI-performance relationship: Empirical findings

Researchers from various disciplines have addressed the issue of the VI-performance relationship empirically. The points of departure for these studies differ, but they tend to apply the same research strategy. Usually, the impact of one or more explanatory factors on performance is estimated by using some statistical procedure(s), keeping other factors constant. Findings must be treated critically, as performance measurement imposes potential shortcomings, such as instability of performance, causal complexity and use of retrospective data (March & Sutton, 1997).

Within neoclassical economics, perfect competition prevails; firms within an industry are identical, and price- and quantity decisions are the only strategic choices. In meeting the same demand, firms would in the long run achieve average profits.

Hence, an analysis of inter-firm differences would give no meaning, given that market failures do not exist (Yao, 1988). In real world, however, this is not the case.

A useful point of departure for assessing past empirical research related to the VI-performance relationship is the meta-analysis by Capon *et al.*, (1990). Their analysis was based on 320 empirical studies – stemming from journals, books, proceedings, dissertations and working papers during the period from 1921 to 1987 – wherein financial performance is the dependent variable. In their analysis, they identified 15 studies where VI (forward or backward) is utilised for explaining firm (or industry) performance. Several studies used multiple tests. 69 cases reported a positive relationship between VI and financial performance, while 35 reported a negative relationship. In sum, this is indicative of a positive covariation between VI and performance. However, when distinguishing between industries and firms/business units, the findings become highly mixed. The aggregated findings, thus, obviously need closer examination.

In Table 1, studies investigating the VI-performance relationship are summarised. The table reports the industry analysed, theory applied, covariation between VI and performance, and measures applied for each study.

Table 1 Studies investigating the VI-performance relationship empirically*

Source	*Focal industry (sample)*	*Theory*	*Co-variation*	*Measure*	
				Vertical integration	*Financial performance*
Vesey (1978)	600 BUs from 100 companies (PIMS)	IO	+/-	VA/S (profit adjusted)	ROI
Levin (1981)	53 oil industry companies	IO	0	Self sufficiency ratio (crude oil and refinery)	(Net income + interest payments) / sales
Buzzel (1983)	PIMS (1,649 BUs)	IO	+/-	- adjusted VA/S - Relative to competitors (self report)	ROI and others
Maddigan & Zaima (1985)	Random sample of 45 firms	IO	-/+	VIC index (Maddigan [42])	ROA
Harrigan (1986)	192 firms in 16 industries	IO	+/-	Degree, breadth, stages and form	Successful vs. unsuccessful (self report and objective measure; ROS)
Martin (1986)	288 US industries	IO (SCP)	+/-	Back- and forward integration from Input-/output tables	Price cost margin = VA adjusted for labour and capital costs/sales
Chatterjee (1991)	116 vertical mergers (1962-79)	SM	0/+	Actual mergers compared to firms in the same industry (SIC)	Cumulative abnormal return in market value
D'Aveni & Ravenscraft (1994)	3,185 BUs from 200 industries	SM IO	(+)	Internal flow of goods relative to external	Operating revenue over total sale
Edwards *et al.* (2000)	22 US oil companies	IO	+/++	Share of own production from subsidiaries	Standard & Poor's stock rating
Fan & Lang (2000)	About 500 industries	SM TCE	- -	Vertical relatedness (Rumelt [35]) – input transfer between industries	Excess value=firms actual value over imputed value, (market value)
Bhuyan (2002)	43 food manufacturing industries	IO TCE	- -	Forward integration from input-output tables (Davies & Morris [36])	Industry price cost margin: (total sales – total costs)/total sales
Peyrefitte & Golden (2004)	US Computer hardware industry (50 firms)	SM	-	Between and within stage vertical integration (Davis & Duhaime [37])	ROI and Net income/total sales

*) The 12 studies were published in 11 periodical journals. Analyses cover a great variety of industries – across as well as within – and time series as well as cross sectional data for the period from 1948 to 1997. None of the studies entered Capon *et al.*'s [34] meta-analysis.

Inspection of Table 1 reveals that findings regarding the VI-performance relationship are inconclusive. The table shows that a large number of measures have been applied, both for VI and for performance. In addition, the settings and periods studied also vary.

When going into more detail, we find that Vesey (1978: 11) defines VI as: *"…the ratio of value added to sales, with both numerator and denominator adjusted for profits"*. VA/S is a proxy measure for VI first suggested by Adelman (1955). Vesey uses the PIMS database including about 600 business units. Performance is measured by return on investments (ROI) and he finds that a high degree of VI is not always profitable. Backward VI, he claims, is more profitable than forward VI, and VI is the third most influential factor on performance, after market share and investment intensity.

Buzzell (1983) also employs the VA/S measure, adjusted for net profit and 20 percent of investments, and the PIMS database. His data covers 1,649 business units in manufacturing industries. Profitability is measured by means of ROI. He found that both very low and very high levels of VI yield above-average rates of return. Further, ROI decreased consistently across the whole range of VA/S for producers of raw and semi-finished material. When using a subjective measure for VI (obtained by asking managers whether their line of business is less or more VI than that of competitors), ROI was slightly enhanced by backward VI.

The justification for using VA/S as a measure for VI is based on the assumption that it will increase as firms integrate vertically, forwards and backwards, when transactions are carried out within instead of across firms (Davies & Morris, 1995). Several authors have pointed to several shortcomings in this measure. For instance, Maddigan & Zaima (1985) assert that more profitable firms, or firms with relatively high labour and capital productivity, will score better than other firms by using the VA/S measure. By comparing Maddigan's (1981) *vertical industry connections* (VIC) to the VA/S in a random sample of 45 firms' ROA, they found that the two measures yielded opposite conclusions. Also, the VA/S measure has been criticised for being higher the closer the firm is to the raw material source, and therefore for being more sensitive to backward than to forward integration (Martin, 1986). In addition, VA/S does not reflect the choices firms make about coordinating potential separate activities (Caves & Bradburd, 1988), and also – when measured at individual enterprises – it becomes sensitive to multi-plant backward integration (Levy, 1985). A final objection against this measure is its failure to capture a firm's partial consolidation of control due to contracts and other agreements (Frank & Henderson, 1992).

The VIC index introduced by Maddigan (1981) relies on national input-output tables (Leontief, 1951), information on the industries in which firms operate and the average share of these industries' production. This measure is also criticised, arguing that it fails to account for intra-industry partial integration (Levy, 1985) and that it is a firm-level index inadequate at industry level (Davies & Morris, 1995). Henderson (1994) also criticises this measure for only including industries in which the firm has a 100 percent ownership.

Levin (1981) introduces "self-sufficiency" as a measure of VI when examining VI in the US oil industry. According to Levin, self-sufficiency is the quotient of crude oil production divided by the sum of crude oil production plus refinery runs. For a refiner without its own crude oil supply, this quotient will take the value 0, whereas a crude oil producer without refinery capacity will have a quotient of 1. Balanced integration, then, is assigned the value 0.5, where over- and under-sufficiency deviates symmetrically from 0.5. Performance is measured by net income plus interest payments divided by total revenue. Levin found, however, that performance was not affected by the degree of VI towards crude oil or refin-

ery production, but he also observed that VI helps to reduce performance variations, and that the self-sufficiency ratios of firms vary over time, but without a specific evolutionary trend.

Harrigan (1986) underlines the many facets of VI and argues that it is a multidimensional construct. She distinguishes between *degree*, *stages*, *breadth,* and *form* of VI and identifies successful and unsuccessful firms from in-depth interviews with 192 firms in 16 industries for the period 1960–81. *Degree* of VI is measured by the percentage of internal purchases (backward VI) and sales (forward VI). *Form* of VI is measured by the ownership percentage in the venture. She asserts that involvement in many integrated stages can not be sustained with the same success throughout the industry's entire life-span and that VI is indeed a costly strategy. According to Harrigan, VI should therefore be adjusted as conditions change.

Martin (1986) constructs his measure by input-output tables of the average (backward and forward) VI in the industry, ranging from 0 (no VI) to 1 (full VI). It was tested within the limits of a structure-conduct-performance model, where performance was measured by an industry price-cost-margin. Martin found that the effect of VI on performance in manufacturing industries is complex, depending on whether integration goes *into* the industry or *out of* the industry. His findings revealed both positive and negative relationships, supporting a 'case by case' approach.

Chatterjee (1991) compared actual vertical mergers to firms in the same industry. Performance was measured by cumulative abnormal return (stock market measure). Profit gains were found to be about 20 percent in target firms, while acquiring firms recovered almost nothing. His findings corroborated those of the IO literature in the way that advantages through VI are the greatest when acquiring firms operate in concentrated markets and target firms are in competitive markets, as mergers then yield increased market power.

D'Aveni & Ravenscraft (1994) used internal flow of goods relative to external flows to measure VI in their study of 3,185 manufacturing business lines. Performance was measured by the rate of operating revenues to sales. They found that VI units performed marginally better than unintegrated business lines in the same industry after controlling for economies of scale and scope. However, VI units showed higher production costs (especially when integrated upstream), but were found to economise through other cost components (like R&D, advertising, administrative and general expenditures).

In the study by Edwards *et al*. (2000), the VI-performance relationship in the US oil industry was assessed. They measured VI as the share of production coming from own crude oil extraction (i.e. backward VI) and share of refinery runs shipped through own pipelines (i.e. forward VI). Performance was measured by the company stock rating of Standard and Poor's *Stock Guide*. Based on observations from two separate time periods – 1972 and 1992-1994 – they found that performance was strongly enhanced by crude oil production, whereas only a weak positive effect was observed from pipeline integration.

Fan & Lang's (2000) study departed from Rumelt's (1974) diversification strategies. They applied commodity flow input-output tables to capture inter-industry and inter-segment vertical relatedness and found vertical relatedness to be associated with poor performance.

Bhuyan (2002) examined how vertical mergers in US food manufacturing industries affect performance, when simultaneously controlling for industry characteristics (like productivity and competitive conditions). His VI measure was based on input-output tables and earlier work (Caves & Bradburd, 1988; Davies & Morris, 1995; MacDonald, 1985) while net industry profit – computed as a price-cost margin – served as a performance proxy. Bhuyan found that VI negatively affects profitability, as – he asserted – vertical mergers fail to

create differential advantages for the integrated firm.

Peyrefitte & Golden (2004) examined how the performance scores (average 7 years ROI and profit margin) of 50 US computer hardware industry firms were affected by VI. Their study covered the years 1987–1993, and VI variables were constructed as dichotomous dummies (0 or 1) to cover within or between stages VI. By regressing VI variables (together with firm size, financial leverage, debt/equity, and diversification level) against performance they found that VI within a single value chain stage had a significant negative effect on performance – opposite of expected. Between stage VI had an incremental negative, yet insignificant, effect in their study.

Based on the review and discussion above we can conclude that: First, the findings from the different studies above on the VI-performance relationship are ambiguous, which makes it difficult to compare the results. Second, VI is a multidimensional construct, which cover many aspects of organisational life. This property makes VI difficult to measure.

In our view, measures applied to capture VI must be suitable to the specific research problem. Harrigan (1986; 538) expresses it this way: *"…to be useful to managers, measures of VI should not be made at the industry level […]. Some measures should be at the 'firm' level, some measures should look at relationships between business units, and others should incorporate comparisons with how competitors use vertical integration."* Also, how to measure performance presents a measurement problem when attempting to establish the VI-performance relationship. Like Keats & Hitt (1988: 576), we conclude that: *"Performance is a difficult concept, both in terms of definitions and measurement"*. Past empirical studies show that multiple measures have been used.

Below, we present a specific industry setting, in which VI is utilised by firms. We utilise several measures in our examination of the VI-performance relationship in this setting.

Testing the VI-performance relationship

This section reports a test of the VI-performance relationship when taking the concerns regarding measurement difficulties into account. We restrict our study to the Norwegian fish processing industry, and our reasons for doing so are: First, we need a competitive setting in which the units studied are motivated to integrate vertically, and do so to a varying degree. Second, industry firms must vary in terms of the degree of VI, and, finally, detailed data at firm level must be available in order to measure performance and degree of VI. By limiting the study to one industry we avoid problems of the so-called "industry effect", i.e. that performance effects are linked to the industry in which firms operate, not results of the actions firms take. In addition, the difficulties caused by variations across industries and misperceptions about the explained phenomenon (Casson, 1984) are avoided. Thorough knowledge to the industry studied, is a necessity to comprehend which factors influence specific dependent variables (Joskow, 1988).

The Norwegian fish processing industry is an intervening link in the seafood value chain, whose *centre of gravity* lies in manufacturing semi-finished or end products of fish, in which several structural variables motivate for VI. Managers of fish processing firms are exposed to an almost stochastic supply of the most important input factor; namely fish (Dreyer, 1998; Prochaska, 1984). Uncertainty is present downstream the value chain as well, where prices fluctuate heavily and seasonally. Uncertainty is an emphasised motive for VI (Carlton, 1979; Miller & Shamsie, 1999; Walker & Weber, 1987; Williamson, 1991a). Here, uncertainty variations among firms also emerge, as some rely on wild-

caught fish, whereas others process farmed fish – a much more stable supply source. Upstream VI towards fishing or aquaculture, in order to gain control over the most important input factor, is thus a meaningful strategy to reduce uncertainty and/or to secure sufficient supply. Fish farming has emerged as a prominent actor in the industry over the latter five decades. However, traditional fish processing firms have only to a limited extent seized the opportunity to take advantage of this source of supply by integrating upstream towards the fish farming industry.

Industry age has also been argued to be a catalyst for VI. According to the industry life-cycle hypothesis, firms in young and fast growing industries are expected to integrate backwards in order to secure important input factors. As the industry matures, the need for VI diminishes, until it increases once again in the industry's last stages (Langlois & Robertson, 1989; Tucker & Wilder, 1977). The Norwegian fish processing industry can be divided into a "young" and an "old" part. In the young part of the industry, the most important input factor come from aquaculture, whereas the older part relies on wild-caught fish.

The Norwegian fish processing industry constitutes a highly competitive setting, where the input market for fish has been referred to as 'next to perfect', where almost identical commodities are traded between numerous sellers and buyers (Ottesen & Grønhaug, 2005). The fish processing industry consists of approximatly 550 firms of varying sizes. The concentration in the industry is modest, where revenues from the 20 largest actors constitute less than 50 percent of industry revenues. These firms employ about 40 percent of the workforce. The Hirschman/Herfindahl index is about 0.025, indicating very low concentration (Bendiksen, 2001). Few barriers to entry are present, although primary producers (fishing vessels and fish farms) need a license in order to gain entry to the business. Upstream integration towards fishing vessels is, however, strictly regulated.[2]

Detailed data at firm level, both for VI and performance, is needed. Here we had access to a unique database, which has surveyed the profitability and structure of the Norwegian fish processing industry on an annual basis since 1977 (Bendiksen, 2007). From this database, firm level data from financial statements were accessible, and quantities of fish (inputs) purchased. We also interviewed general managers of the 100 largest processing firms, regarding their VI strategies, which enabled us to construct a measure of VI.

Measures

As shown in Table 1 above, multiple measures have been applied in empirical studies to capture both VI and performance. Below we report our effort to measure these variables. The measure for upstream VI constructed for this study is the share of supply from upstream units in which the firm holds proprietary ownership interests (SO). It requires direct ownership and is truncated at zero and one,[3] but is still in agreement with methodological literature recommendations (Blair & Kaserman, 1983; de Koning, 1994; Frank & Henderson, 1992; Peterson *et al.*, 2001), i.e. to ensure continuity in the VI variable. Our VI-variable is based on transfers that can be judged as *internal* (i.e. flows of goods between stages tied together by common ownership) – and displays properties like MacDonald's more macro-oriented MVI-variable.[4] This variable incorporates the main content of the self-sufficiency ratios employed by Levin (1981) and Edwards *et al.* (2000), which assesses the share of total inputs to the focal firm supplied by owned subsidiaries, and is similar to the variable Ohanian (1994) utilised in her study of the US pulp and paper industry. Our operationalisation of VI fully covers at least two of the four dimensions emphasised by Harrigan (1984): *degree* and *form* of VI.

The emphasis on the actual flow of goods between value chain stages, where ownership counters the flow of goods, makes it natural to label our variable as *use* of vertical integration (the extent to which ownership interests in adjacent upstream stages in the value chain appears in the form of actual input streams). From this point of view, it becomes a well-suited measure for the setting studied, and is believed to incorporate the core of the concept *upstream vertical integration.*

When comparing it to other measures applied in the literature, the most obvious and reasonable counterpart would be the 'Value Added over Sales' (VA/S) measure, utilised to a large extent in prior research according to Table 1. Both measures are at firm level, but whilst our measure rests on ownership and "internal" transfers, the VA/S-measure is a proxy to VI, collected from firm accounts. To avoid the potential connection to performance, we also utilise a version of this measure, where profits are subtracted from both numerator and denominator, as previously applied by Vesey (1978) and Buzzell (1983). By comparing these three explanatory variables (SO, VA/S and profit adjusted VA/S), one deficiency emerges: While our measure only reveals upstream VI, value added to sales also embodies effects from downstream integration, i.e. towards the customers. However, following Adelman's (1955) critical remark when introducing VA/S as a measure for VI, it is sensitive for proximity to the raw material source. Hence, upstream VI of firms will be offset – at least partly – by downstream VI, when measured by VA/S.

When measuring performance, stock market based measures – mirroring the expected profitability – are disqualified since, hitherto, shares in fish processing firms are generally not found on the stock exchange. Therefore we utilise the key figures *gross profit margin* (GPM) and *return on total assets* (RTA), meaning the ratio of pre-tax net profits to sales, and the yield of the total capital employed, respectively. Measures like these are the most employed in earlier research (cf. Table 1).

Data

Vertical integration is dynamic (Langlois & Robertson, 1989), a feature retained by our operationalisation (eg. SO). We therefore need to narrow the scope of our analysis. Performance measures are based on annual account reports, and we have chosen the year 2000 as our basis. In 2001, we addressed 100 managers of fish processing firms, and asked them – in hindsight – to state their firm's specific levels of upstream VI, as captured by our VI-measure (SO).

.

Table 2 Statistical means for groups of fish processing firms on our variables

Industry segment	*Share from upstream units (SO)*	*Value added over sales (VA/S)*	*Profit adjusted value added over sales (π-adj. VA/S)*	*Gross profit margin (GPM)*	*Return on total assets (RTA)*
White fish (n=55)	17%	16%	15%	- 1.8%	4.4%
Farmed fish (n=18)	76%	26%	23%	2.6%	9.9%
Both inputs (n=18)	29%	20%	17%	2.9%	10.1%
Total (N=91)	31%	18%	17%	0.0%	6.6%

Since different processing firms utilise different input sources, we distinguish between groups of processors in an input-dependent manner: firms who process *i)* only white fish, *ii)* only farmed fish (e.g. salmon and trout), and *iii)* both farmed and white fish. As emphasised earlier, the motives for, and outcomes from, VI can vary depending on the nature of the input. This grouping coincides with the focus on 'stra-

tegic groups' (Thomas & Venkatraman, 1988), where industry member firms are classified according to their competitive strategies. Descriptive statistics for the groups are entered in Table 2.Table 2 shows that firms utilising farmed fish on average are more vertically integrated and more profitable than those processing only white fish. Even though the tendency is weak, it seems as though firms producing both white and farmed fish are the most profitable, even though their level of VI (on average) is lower than for farmed fish firms. For comparison, the average RTA for all Norwegian mainland industries (oil- and gas extraction excluded) was 6.7 percent that year (Statistics Norway, 2003). In the Appendix, the data set is more thoroughly examined with respects to statistical analyses.

Pearson's correlation tests (see A2 in Appendix) reveal that the groups of white fish and farmed fish processors differ significantly in terms of all three VI-measures. The farmed fish and the combined white/farmed fish groups differ only in terms of share from own units (SO), while no significant difference can be found between the white fish group and the combined white/farmed fish group. Also, all the VI measures are significantly correlated to each other (see A2 in Appendix). With measures showing correlation to this degree, we can conclude that they more or less capture the same phenomenon.

In the next section, we test the correlation between our independent and dependent variables, reveal our findings, and comment on the implications thereof.

Results and discussion

Table 3 shows the results from our regression analyses, where each of our explanatory variables (the three VI measures SO, VA/S, and π-adjusted VA/S) is regressed against our two dependent performance variables (GPM and RTA). Six different OLS regressions are applied to test for covariation between VI and performance.

Table 3 Test statistics (constants, unstandardised coefficients (β), R^2 and p-value). Separate (OLS) regressions of vertical integration against performance (in 2000)

Dependent	*Independent*	*Constant (β_0)*	*β_1*	*R^2*	*p-value*
Gross Profit Margin	Share from own (SO)	- 0.016	0.052*	0.049	0.035*
	VA/S	- 0.043*	0.236**	0.089	0.004**
	VA/S (π-adjusted)	- 0.004	0.024	0.001	0.793
Return on Total Assets	Share from own (SO)	0.048**	0.058	0.027	0.121
	VA/S	0.017	0.268*	0.051	0.031*
	VA/S (π-adjusted)	0.062*	0.024	0.000	0.856

*) Significant correlation at a 0.05 level (2-tailed).

**) Significant correlation at a 0.01 level (2-tailed).

The main findings from Table 3 is that VI only to a very limited extent can explain the inter-firm differences in profitability in the Norwegian fish processing industry in 2000, as the models have modest explanatory power (R^2) and regression coefficients are rather low (except for VA/S). None of our six models are able to explain more than nine percent of the variation in profitability in our sample – and the worst model is unable to explain any of the variation. This is in line with Wensley's (1997) claim that, since measurement problems are highly present when financial performance measures are used, no single variable can account for more than 10 percent of the variation in business performance. In addition, the determinants of business success are multiple. He (Wensley) concludes, accordingly, that: *"…in strategy situations the*

variance nearly always matters more than the mean!" (p. 75). Hence, it comes as no surprise that our regressions demonstrate modest explanatory power, since – obviously – many explanatory variables are left out. Bhuyan's study (2002) can serve an example in that respect. When testing nine industrial organisation variables on industry profitability (measured by a price cost margin) in the US food manufacturing industries, only 36 percent of the total variance was explained (R^2). In his case, the contribution from including VI to explain industry profitability was small, and its impact was negative.

Our results show that when measuring VI by VA/S, it significantly improves firm performance (though, with modest explanatory power). As noted by several authors,[5] a major weakness of this measure is its positive correlation to profits, i.e. it is influenced by factors other than VI, leading to spurious results when regressed against profit. When regressing VA/S against gross profit margin (i.e. the model with the highest explanatory power), we merely state that pre-tax profit should equal a constant multiplied by the value added, which in fact should hold since profit should be strongly correlated to the value added. When utilising π-adjusted VA/S, the effect of VI becomes insignificant, R-squared shrinks to nothing, and the coefficients (β_1's) are decimated.

Our own measure (SO) seems to have a significant, yet negligible, positive effect on performance measured by GPM. When measured by RTA, the effect is similar, but insignificant. Applying this measure to white fish firms only, using 1997 data, Dreyer *et al*. (2001) found that VI had contradictory, but non-significant, effects on the two performance measures; positive for GPM but negative for RTA. One explanation could be that VI brought about positive profitability effects, but insufficiently to give a reasonable return to the additional funding required when obtaining proprietary interests in upstream supply units. Here, the effects from VI are uniform for both performance measures, and the difference compared to Dreyer *et al*.'s (2001) findings, can be interpreted as stemming from altered input market conditions in the period. In 1997, the fish supply exceeded demand. From 1997 until 2000, cod catches fell by 45 percent, and demand exceeded supplies, which led to a 90 percent input price increase. In addition, the performance of white fish firms was influenced by low market prices for salted and frozen fish in 2000. The markets for farmed fish were good, with peak prices, which increased the performance of fish farmers. Farmed fish processors, however, struggled with high input prices, which resulted in weak performances for this segment. Obviously, the forces influencing the profitability of VI were altered in the period, since the value of the "controlling" supply increased from an input-security point of view. However, by including farmed fish processors in the sample scrutinised here, comparisons between the studies cannot easily be made, since sourcing conditions are qualitatively different in the white fish and farmed fish segments. Finally, the possibility that our data deviates from the normality criteria justifies a cautious treatment of our findings. Hence, the effect of upstream VI on performance is vague and difficult to evaluate coherently.

The curse of endogeneity

In every attempt to reveal the performance effect from strategic change – the main objective of strategic management – researchers are facing the problem of endogeneity[6]. Since the strategic choices made by managers are guided by their expectation of future performance, i.e. management's self-selection of strategy, econometric procedures to account for possible omitted variables should be employed – an argument put forward by Wensley (1997) above and further elaborated by Masten (1993), Hamilton & Nickerson (2003), Jacobides (2005) and Desyllas (2009) among others.

In our research problem several problems arise when trying to address endogeneity. Firm heterogeneity regarding the origin of vertical integrated fish processing firms is highly present in our setting. Some firms are vertically integrated due to political legitimacy, regulations and legal exemptions. This is the case for large white fish filleting plants, who were granted cod trawling licences and by exception clauses allowed the right to own (majority interests in) fishing vessels, from regional and industrial policy reasoning. The main objective was to ensure a stable supply to large plants, in order to secure employment in communities relying heavily on fish processing firms, and to improve profitability, since supply from smaller coastal vessel could be limited due to weather and availability conditions. These fish processing firms can be argued to be "locked into" a VI strategy, dating back at least 20–30 years. Hence, the firm's existing managerial team, have had next to no influence in this decision, even though they prevail over the flow of fish from these vessels. In as much as we want to measure the outcome of strategic decisions, in some of our cases we measure long term lagged variables of policy outcomes. The variables we utilise are continuous, so that it is not a question of make or buy, but to what degree firms make. Also, our variable (SO) depends – among other things – on the size of the quotas allocated to vessels balanced against the capacity of firms.

What further complicates, and render good endogeneity tests impossible, is that some processing firms have minority interests in fishing vessels, and cannot dictate landings or input prices. In such cases, the agreement is more of a social contract, where the processing firm receive landings from the vessel in question if fishing grounds are in proximity to the landing site. Other processing firms are the result of a downstream vertical integration, where fish vessel owners or aquaculture firms have set up or acquired a processing plant. Others again are the result of a long term structuring process, including both horizontal and vertical integration. Hence, the strategic choice of make or buy is enveloped in a heterogeneous industry context, not easily transferable into econometric models. As underlined in Isaksen (2007), a survey among processing firms in 1998 revealed that most firms in this industry (58 per cent) considered upstream vertical integration to be more important in the future. 85 per cent of the managers considered increasing their upstream VI in near future. Five years later, it was hardly any that had pursued this strategy, and the will to VI was vaporised. The reasons for this are many, but by large that the cod quotas in the period fell by nearly 50 per cent, so that upstream VI as a mean to secure inputs lost some of its attraction. Also, reduced industry profitability in the period might have contributed. Hence, the flaw of not correcting for endogeneity in this research is left open, as we subscribe to the motion of Jacobides (2005: 490) that: *"To understand vertical scope, scholars have to understand, at the industry level, the forces that affect it."*

Concluding remarks

Our results reveal that vertical integration has modest effects on firm performance. But can it be that the causality goes the opposite way? Should the research question rather be directed the other way around? Researchers have shown that strategic change is triggered by shifts in competition, and especially declining profits (see Webb & Dawson, 1991). Antithetically; do firms who obtain superior results and succeed in outperforming their competitors, create the financial power and autonomy necessary to bring about the ability to invest in adjacent value chain stages? Instead of scrutinising firms' strategy formulation and alignment, we have measured the actual use of VI. In so doing, we avoid the fact that strategy, or strategy change, outcomes occur in subsequent periods to the actual incorporation of change. We may,

however, simply have revealed the financial effects from capital outlays stemming from strategic alignments like VI. Analogously, firms may integrate vertically for tax reasons (since internal transactions can be carried out at favourable transfer prices to avoid direct taxes like VAT) or in order to create barriers to entry for competitors. To grasp the complexity of the vertical integration-performance puzzle, further research should incorporate other measures for success than merely financial performance. Also, insights into the way strategic changes like VI is formulated, and – of course – implemented in different firms and industries, is likely to generate more knowledge related to this research problem.

The use of vertical integration in this industry is not easy to comprehend, due to the firm heterogeneity and variation in organising the buyer-seller relationships. Whereas many businesses have invested in fishing vessels, others manage the buyer-seller relationship by other means, for instance by offering local vessel owners loans to contract vessels, with an underlying tacit agreement that tie landings to the lender when feasible. As emphasised by Williamsson (1991b: 84): *"Debt, equity, leasing, etc., are more than financial instruments. They are also instruments for governance"*. Others maintain their relationship to fishermen by placing plant premises at fishermen's disposal (for carrying out onshore-related activities, such as baiting, lodging and fishing gear mending), while others again, merely by ways of a common understanding of what is best for the local community, tacitly agree to serve each other. And, as noted by Fine & Hax (1985: 32): *"The crucial element of success of integrating operations is not ownership, but management and co-ordination of the series of processes"*.

Measurement problems are crucial in all empirical studies of VI and have, in fact, been accused for being the primary reason for the limited number of studies carried out (Hay & Morris, 1991; Spiller, 1985). Our results indicate that the VI-performance relationship is sensitive to the measure chosen to test the relation. Measures that easily can be applied in different settings are often based on financial accounts' data. As performance measures often originate from the same data source, potential multicollinearity problems may weaken the statistical validity. Here, we apply a VI measure based on input volume to evade this problem. Our conclusions regarding the VI-performance relationship were not altered by using account-based measures of VI, which indicate a high level of internal validity when applying different measures of VI at firm level.

External validity, however, is at stake, since the sample examined here was collected in the same industry in a single year. Our choice of industry was made to control for the potential industry effect, since all firms entering the analysis face similar external conditions. However, as our findings are based on the situation at only one point of time, some variation can be lost. As emphasised earlier, VI is a highly dynamic concept, which makes inter-year comparisons both time- and resource-consuming. However, earlier time series approaches, utilising the whole population for the period 1977–1992 indicate no direct effect between VI and performance in this industry (Dreyer *et al*., 2001). From a policy point of view, knowledge of this relationship can guide authorities considering regulations regarding the boundaries between segments in the seafood value chain.

Since one third of the firms state their share of inputs from subsidiaries to be zero, our operationalisation of VI violates the requirements for a normal distribution – on which the OLS procedure relies – due to skewness. One way of avoiding this could be to omit the 'zeros', which would have reduced our sample dramatically. But it would also imply a reluctance see the choice of *no* vertical integration as part of the business strategy of a huge number of fish processing firms. A test, wherein we divided only between those who were integrated and those who were not, yielded no

additional explanatory force. Neither did it do so when we omitted the 'zeros'. Therefore we present the material 'as is'. As the zero-group can be argued to consist of two strategically different groups of firms – one group choosing to use the market for transactions and the other wanting to integrate vertically but lacking the financial ability – a way of separating these two groups would be recommended for refining our research.

Our findings, however, support Harrigan's (1986) conclusion that degree of VI should be measured at firm instead of industry level when assessing the impact of VI on performance. As demonstrated here, conclusions concerning this relationship are sensitive to studies based on measures at different levels, i.e. at firm level and industry level. Thus, we recommend applying measures of VI developed at firm level that do not originate from financial statements when analysing the VI-performance relationship, in order to avoid possible spuriousness in regression results. We also suggest developing measures that are adapted to the production and setting studied. This recommendation may, however, limit the external validity and application of the same measurements to different industries.

A relevant question for future research is whether the VI-performance relationship is sensitive also for the way performance is measured. Our literature review revealed that several measures of performance had been applied in previous studies of this relation. According to conceptual models, internal pricing strategies between adjacent stages in the value chain are crucial for situations where profit is directed in the financial statements of firms. This indicates that in order to better understand the ambiguous findings in studies of the VI-performance relationship, we need to apply different measures of performance when assessing this relationship. That remains for further research.

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Appendix

Table A1 Pearson's correlation matrix – between measures in groups of processors

Groups	*Farmed fish (n=18)*					*White and farmed fish (n=18)*				
	SO	*VA/S*	*π-adj. VA/S*	*GPM*	*RTA*	*SO*	*VA/S*	*π-adj. VA/S*	*GPM*	*RTA*
White fish (n=55)	0.00*	0.01*	0.02*	0.19	*0.10*	0.11	*0.02**	*0.22*	*0.00**	*0.05*
Farmed fish						*0.00**	0.16	0.15	0.92	0.96

*) Significant correlation on a 0.01 level (2-tailed). Figures in *italics* imply tests assuming equal variance, as determined by Levene's test for equality of variances. Means, by groups of processors, are given in Table 2.

Table A2 Pearson's correlation matrix for measures utilised on total sample (N=91).

	SO	*VA/S*	*π-adj. VA/S*	*GPM*	*RTA*
SO	1	0.46**	0.38**	0.22*	0.16
VA/S		1	0.94**	0.23**	0.23*
π-adj. VA/S			1	0.28	0.19
GPM				1	0.82**
RTA					1

*) Significant correlation on a 0.05 level (2-tailed).
**) Significant correlation on a 0.01 level (2-tailed).

Normality tests

Our data exhibit some features demanding awareness when regressing the level of VI to performance. Two conditions put forward this demand. Of the 100 firm manager interviews, only 92 answers were satisfactory. One firm, however, was identified as an outlier due to extreme values on the performance variables. First, of these 91 ob-

servations, EBIT was negative for 43 firms (white fish firms were overrepresented among these). Hence, for these firms the VA/S and profit-adjusted VA/S measures were identical and almost perfectly correlated (0.94 and significant at a one-percent level). Second, the extent to which firms are not vertically integrated, as captured by our variable (SO), also brings about more careful treatment. Since about one third of our firms has no ownership in the upstream industry and attains a null value for this variable, the median of SO is only 0.2, even though firms can be found all along the range from null to one. Table 6 presents the key statistics of our variables for the whole population (N=91).

Table A3 Descriptive statistics for the variables – N=91

Variable	*Mean*	*Std. Error*	*Median*	*Minimum*	*Maximum*	*Skewness*	*Kurtosis*
SO	0.3076	0.0349	0.20	0	1	0.836	-0.508
VA/S	0.1844	0.0104	0.17	0	0.48	0.945	0.833
VA/S (π-adj.)	0.1674	0.0097	0.15	0	0.43	0.945	0.948
GPM	0.0003	0.0082	0.00	-0.17	0.30	0.982	3.326
RTA	0.0659	0.0123	0.06	-0.17	0.44	0.664	0.805
					Std. Error	0.253	0.500

Table 6 displays the mean and its standard error, the median, maximum and minimum values that our variables take. Additionally we have included the skewness and kurtosis of the variables, since these features are decisive for the normality properties of our variables. Perfect normal distributions would display skewness and kurtosis values of zero. This is, however, rather uncommon in social sciences data (de Vaus, 2002).

With our variables, concerns regarding skewness and kurtosis exist. However, we have deliberately not attached asterisks to these values, indicating them to be diverging from the normal distribution assumptions, since methodological advice is conflicting. For instance, according to SPSS, both skewness and kurtosis is within the range of a normal distribution range if the ratio of the values to their standard error is less than +/- 2. In our case, all variable are skew (to the right) while only the GPM variable is more than normally peaking unacceptable. When utilising *Pearsons index of skewness*, which Byrkit (1987) ascribes as a correct operator for deciding whether or not distributions are significantly skewed, none of the variables are deemed too skew. The *Jarque-Bera* test (Gujarati, 1995), which simultaneously tests for skewness and kurtosis, and the *z*-test (Hair Jr. *et al.*, 1995) return values for all variables that are inconsistent with normality. And, finally, the *Kolmogorov-Smirnov* and the *Shapiro-Wilks* tests return test statistic values for all variables (RTA excepted) that suggest violations to the normality assumption.

While the negative kurtosis for our vertical integration measure (SO) indicates a distribution with heavy tails, the other variables are distributed with peaks greater than in standard normal distributions, especially for the gross profit margin, where the histogram shows that about half the firms have a gross profit margin within the range of +/– 3 percent.

As mentioned, the kurtosis and skewness of the data are decisive for the normality of the distribution. The tendency displayed here, especially the skewness of the variable distributions, questions the fundamental assumption of normality. However, inspecting our plots (box plots, normal probability plots and plots of the actual deviation of the scores from a straight 'normal probability' line) and outliers gave no further reasons for concerns,

therefore, we continued as if our data were normally distributed.

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As mentioned, the kurtosis and skewness of the data are decisive for the normality of the distribution. The tendency displayed here, especially the skewness of the variable distributions, questions the fundamental assumption of normality. However, inspecting our plots (box plots, normal probability plots and plots of the actual deviation of the scores from a straight 'normal probability' line) and outliers gave no further reasons for concerns, therefore, we continued as if our data were normally distributed.

Notes

1 When introducing the value chain concept, Porter (1985: 36) defined it as "…a collection of activities that are performed by the firm to design, market, deliver and support its product". He further remarked that "A firm's value chain is embedded in a larger stream of activities (…) the value system" (p. 34). Others use the term value-added chain to denote the various steps goods or services go through from raw material to final consumption (Johnston & Lawrence, 1988). The use of the term value chain in this article covers the adjacent vertical activities both within and outside the firm, and thus contradicts Porter's terminology, as does Cacciatori & Jacobides (2005).

2 Legislation calls for majority owners of fishing vessels to be registered fishermen. In some cases, white fish filleting firms were granted sole ownership to a fleet of wet fish trawlers, which served the firms with most of their input needs. However, in terms of long time industry performance, during the period 1993–2001, these firms have been the industry losers (Bendiksen, 2001), and the number of filleting plants has been dramatically reduced.

3 Unintegrated firms – or more accurately, units without ownership interests in upstream units – will be assigned the value 0, while 1 is assigned to firms receiving all inputs from subsidiaries. We do not assign values > 1, even though situations can occur where firms sell excess upstream production. In our industry this might arise in seasons with high geographical fishing pressure. Over the year, however, this will balance.

4 MVI = vertical integration restricted to the manufacturing channel; the share of industry shipments to manufacturing establishments that are directed internally, to the sellers establishments (MacDonald, 1985).

5 See for instance Burgess' comment (1983) to Buzzel (1983), where he demonstrates that the 'VA/S'-measure for vertical integration has a positive correlation with return on investments (ROI), and therefore is subject to tautological entities, which in regression analyses give rise to the discovery that profit equals profit.

6 According to Hamilton & Nickerson (2003: 53) the concept of endogeneity in this research problem can be illustrated: "…an analysis that regresses profitability on make versus buy will likely lead to biased coefficient estimates of the impact of this strategic choice on performance unless we control for self-selection. The fundamental question for assessing the impact of choosing to buy is this: What profit would the manager's organization earn if he had chosen to make instead? We are not likely to provide an accurate answer to this question by comparing the profits of firms choosing to make with the profits of those choosing to buy, since the observed outcomes may not correspond to the counterfactual performance levels of interest. For example, firms choosing to make may have particular production capabilities that make this a highly profitable choice. On the other hand, firms choosing to buy may not have these production capabilities. Consequently, had the 'buy' firm chosen to make, they would have been much less profitable than those firms who actually chose to make. As a result, a regression of performance on the make versus buy choice, that does not allow for endogeneity of the choice may not answer the strategy effect question of interest."

Differences in harvesting and marketing strategies between Iceland and Norway

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Abstract in English:
For decades, whitefish industries in Iceland and Norway have produced similar products and have exported to the same global markets. Nevertheless, there are indications that the Icelandic industry has been more profitable than the Norwegian industry over the same time period. Therefore, this study aims to determine if the two competing industries pursue different marketing and harvesting strategies to maximise their take of one of the region's most valuable natural resources. To test the hypotheses, raw material supply data and product sales data were collected and analysed. The results revealed that Iceland was pursuing a differentiation strategy by exporting more high-priced, fresh whitefish fillets. This marketing strategy was aligned with a procurement strategy that focused on obtaining fresh, high-quality raw materials caught by hook. In contrast, the Norwegian industry was following a low-price strategy by catching more fish with gillnets and selling the unprocessed fresh or frozen fish at a low price. It has been argued that the superior harvesting and marketing strategies of the Icelandic industry may be rooted in factor conditions that are difficult to duplicate and a rigid institutional framework in Norway. This framework is related to the freedom to organise the value chain (i.e. by vertical integration) and the transfer of licences to vessels that can continously supply high-quality raw materials. However, to adopt the Icelandic institutional framework, Norwegian authorities must take pivotal steps.

Abstract in Norwegian:
Norge og Island har lenge vært konkurrenter. De fanger mange av de samme artene og produserer like produkter som eksporteres til et globalt marked. Flere forhold tyder på at islandsk fiskeindustri har hatt bedre lønnsomhet enn den norske. Denne analysen retter derfor oppmerksomheten mot om industrien på Island og i Norge har valgt ulike høstings- og markedsstrategier. I analysen benyttes data fra fangst og produksjon av hvitfisk i de to landene. Resultatene i analysen viser at islandsk fiskeindustri har valgt en annen markedsstrategi enn den norske. Islendingene produserer langt mer høyt priset ferske filetprodukter enn nordmennene. Denne markedsstrategien er godt koordinert med høstingsstrategien som er valgt. Særlig påfallende er det at en langt større andel av fisken fanges med krokredskaper enn i Norge. I Norge er det valgt en lavprisstrategi. Her fanges fisken i en intens vintersesong og garn er et effektivt og dominerende fangstredskap. Den norske produktporteføljen er da også dominert av konvensjonelle produkter. I tillegg eksporteres det en stor andel ubearbeidet rund hvitfisk – både fersk og rundfrossen. I analysen diskuteres det om nordmenn kan kopiere islendingenes fangst – og produksjonsstrategi. Det konkluderes med at det er mulig å kopiere islendingens forvaltning av fiskeressursene og regler for økonomisk organisering. Islendingene har imidlertid bestander med et annet vandringsmønster enn de norske. Det vil derfor være vanskelig for nordmenn å kopiere islendingens suksess – selv om det blir gjort forsøk på å kopiere islandsk forvaltning.

Keywords:
Differentiation strategy; low-price strategy; procurement strategy, factor conditions

Introduction

The Nordic countries of Iceland and Norway have in common the control over extremely valuable fishing grounds. Geographically, Iceland is an island situated in the North Atlantic Ocean, while Norway is a part of continental Europe. In addition, Iceland pursues fishing in its surrounding waters, while Norway practices fishing off its western and northern coasts. Both countries harvest the same type of natural resources, with the most valuable whitefish species being cod, haddock and saithe, which are processed and primarily exported to the same global markets.

In Iceland, fishing has been the most prominent industry for decades (Knutsson, 2001). However, the importance of the fishing industry in Norway has diminished since the 1970s when valuable oil fields were discovered. The revenue from exporting fish from Iceland contributes to approximately one-third of the total value of exports, while in Norway, the proportion is around 5% (Björgvinsson, 2014). Therefore, it seems reasonable to state that the fishing industry is more important to Icelanders than Norwegians.

Firms within the whitefish industry in Norway and Iceland have both been through substantial structural changes over the past few decades. In Norway, the whitefish fillet industry, characterised by weak profitability, has been forced to close its plants. According to Finstad *et al.* (2012), the number of plants has decreased from approximately 100 in the 1970s to a total of 10 in 2010. Conversely, in Iceland, the fishing industry as a whole has been relatively profitable since the early 1990s (Knútsson *et al.*, 2011). This is mainly because of deregulations and other legislative changes, which have resulted in a more consolidated industry. Many firms in the fishing industry have been acquired or merged primarily using the Icelandic Stock Exchange as their funding source (Einarsson, 2003; Knútsson *et al.*, 2008; Pétursson, 2013). Moreover, Björgvinsson (2014) found that his sample of 10 Icelandic firms outperformed the entire Norwegian whitefish fillet processing industry.

This study is motivated by the question of why sustainable performance differences occur among the same type of industry located in different countries. This study continues by reviewing strategy literature and developing working hypotheses. Subsequently, the research design and results are presented, followed by the discussion and conclusion.

Theory and hypotheses

Strategy theory, which explains why some firms in a particular industry are more profitable than others in the same industry, often asserts that firms that achieve higher or superior returns have some type of advantage over their competitors. According to Porter (1979; 1980; 2008), strategy refers to making choices that lead to sustainable superior performance. A firm's strategy is also shaped by external forces and firms that are more capable of minimising external threats (e.g. the entrance of a new competitor) and exploiting opportunities may achieve competitive advantages.

Barney (1991), on the other hand, claimed that internal resources can explain the performance differences between firms that operate in the same industry. Barney also argued that firms that repeatedly achieve superior returns utilise a resource portfolio, which is heterogeneous and immobile between firms. In addition, if such a portfolio cannot be matched or surpassed by competing firms, then the firms holding this unsubstitutable resource portfolio are said to have a sustained competitive advantage. Furthermore, empirical studies have indicated that both industry- and company-specific attributes may influence firms' financial performance (Rumelt, 1991; Schmalense, 1985). Consequently, it can be argued that the industry perspective of Porter and the firm perspective of Barney are complementary.

Firms can also gain competitive advantages by adapting to dynamic changes in the environment (Teece *et al.*, 1997), cooperating with other firms in different industries (Lavie, 2006) or possessing knowledge that is considered more valuable than the knowledge within competing firms (Grant, 1996). All of these theories are almost without exception based at the firm level.

However, when comparing industries at the national level, certain approaches must be adapted to national differences. For industries based on natural resources, the resources in terms of accessibility, quality and volume obviously differ. In addition, the cost of input factors, such as labour and capital, may differ between nations (Hunt & Morgan, 1995). Furthermore, the competitive climate may differ due to, for example, legislative dissimilarities and how intermediate markets are organised.

In general, all firms that strive for a profit by selling their products in global markets must base their strategies on resources and capabilities that give them sustainable competitive advantages. Even though organisational-specific advantages are important, a competitive advantage in a global context may depend on country-specific or geographical advantages.

According to Porter's diamond theory (1990), the recipe to gain a national competitive advantage in an industry is through searching for innovative ways to keep the industry upgraded with the best production processes available compared to competing nations. However, in order to gain a competitive advantage at a broad national level, it will take a significant amount of time. Thus, if the innovation processes slow down or even stop in an industry, then the competing nations will take advantage of this gap.

Advantages related to factor conditions at the national level can be a source of sustained competitive advantages for national firms in global markets (Porter, 1991). In regard to the present paper, access to abundant marine resources maintained under national control can be a source of competitive advantages.

Another important issue for understanding the national differences between firms' performance is the capability differences that impact the way strategies are chosen. For example, in this paper, both nations have access to the same fish species, but attributes, such as fish migration patterns or national infrastructure and logistics, may impact strategic capability alignment (Luo *et al.*, 2011). In addition, governments are responsible for making laws and regulations that all firms in an industry must comply with on a continuous basis (Joshi & Dixit, 2011). The government will therefore always have a significant impact on the conditions that create competitive advantages at the national level (Porter, 1991).

Finally, national environmental differences (i.e. economic, institutional, socio-cultural and industrial) have an impact on the strategic alignment of firms and their performance (Luo *et al.*, 2011). The present study examines how two competing industries exploit a renewable resource. More specifically, it focuses on how they harvest and process a common national wild fish resource when access is limited by a number of institutional barriers. The licenses to harvest are, for example, allocated differently in the two nations along with the degree of freedom in terms of organising the value system both horizontally and vertically.

Working hypotheses

Since the turn of the millennium, the Icelandic whitefish processing industry has provided higher margins (EBIT/Revenue) than the Norwegian industry (NOU 2014:16). After the financial crisis in Iceland, which occurred in 2008, this difference has been substantial (Iceland > 12% vs. Norway < 2%). Previous studies regarding the profitability of the fishing industry in Iceland and Norway have pointed in the same direction. According to a report by Íslandsbanki (2012), the profitability of the fishing industry in Iceland was described as 'increasing' from the year Iceland implemented its quota system. The report further stated that the average EBITDA margin for the fishing industry as a whole was 29% in 2010, compared to 16% in 2004. A possible explanation for this increasing margin is due to the dramatic fall in the exchange rate as one of the consequences of the financial crisis. Conversely, in Norway, there was a different story in regard to profitability in the whitefish industry (Grimsmo & Digre, 2012).

As stated earlier, Björgvinsson (2014) found that his Icelandic sample of 10 firms outperformed the entire Norwegian whitefish fillet processing industry. His Icelandic sample included one global firm, four diversified and ver-

tically integrated firms, two specialised and vertically integrated firms and three specialised firms that were comparable to the firms in the Norwegian population. Moreover, the performance differences decreased when less relevant strategic groups were removed from the Icelandic sample, since the large vertically integrated and diversified companies were the better performers in Iceland. The performance differences also decreased when financial matters, such as depreciation, amortisation, interests and taxes were considered.

Now that all of the performance differences have been disclosed, we will continue by developing working hypotheses related to the industries' strategic orientations and factor conditions in order to explain the variations in profitability between the two nations.

The research questions in this study are as follows:

> *Does the Icelandic whitefish industry have superior factor conditions and/or superior marketing and harvesting strategies over the Norwegian industry?*

If so, are the advantages duplicable?

Working hypotheses related to these research questions will be presented and connected to this study's theoretical framework, as illustrated in Figure 1.

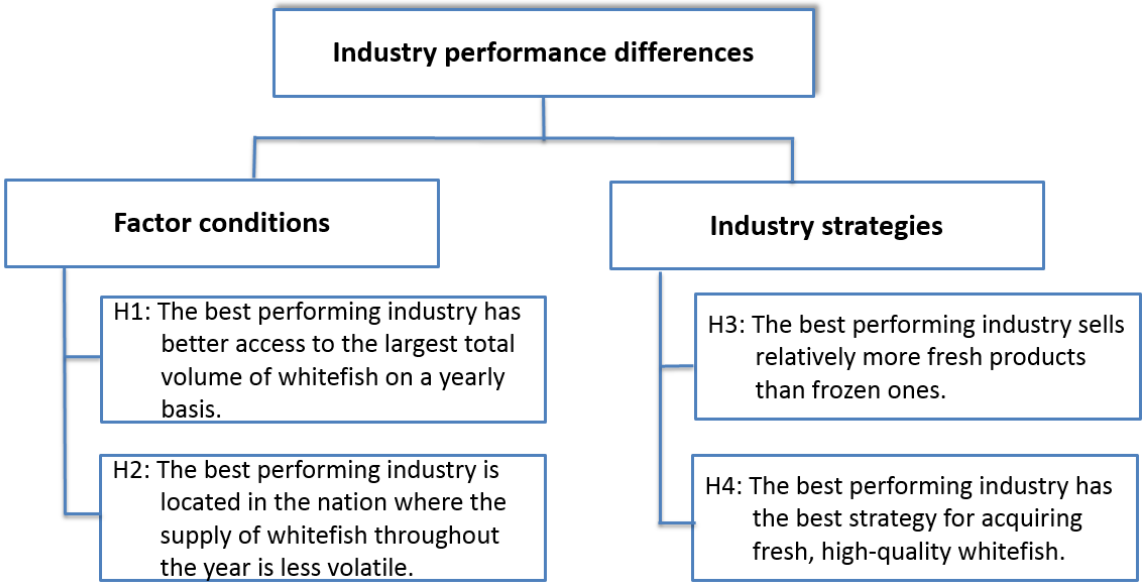

Figure 1 Working hypotheses

We will continue by first developing working hypotheses related to factor conditions (see H1 and H2 in Figure 1).

Access to whitefish resources

Both Iceland and Norway have introduced 200-nautical-mile zones to protect their fish stocks against overfishing by foreign vessels. Moreover, they have introduced a quota system based on the total allowable catch (TAC) in order to prevent overfishing. However, the migration patterns of the species have created an uneven access to the wild fish resources for the industries in both countries. This resource access is based on biological factors as well as other factors that are beyond the companies' control (Milliken, 1987).

The main input required to keep the whitefish processing firms in operation is the sufficient supply of whitefish. However, one problem that both of these nations face is that whitefish is a resource that lives wild in the ocean. In order to supply it onshore, it must be harvested offshore, given the rules and regulations of the fisheries management system. The processing industry in the nation that catches

the most whitefish is expected to have the largest throughput and with it, an economics of scale advantage over its rival. Therefore, the following hypothesis is posited:

> ***Hypothesis 1:*** *The best performing industry has access to the largest total volume of whitefish on a yearly basis.*

Supply patterns throughout the year

The variation in production volumes over the year is one of the greatest challenges for fillet companies (Lorentzen *et al.*, 2006). In Norway, there is a distinct seasonal landing pattern throughout the year (Nilssen *et al.*, 2015; Dreyer & Grønhaug, 2004), whereas there is less seasonal variation in the whitefish species in Iceland, although there is a seasonal peak in the winter (Knutsson *et al.*, 2011). In Norway, approximately 63% of the cod is landed during the first four months of the year, compared with 42% for Iceland (see Table 2 for detailed information on the monthly landing of raw fish in Iceland and Norway).

If the supply varies from month to month, then the production capacity will not be utilised efficiently given that the capacity is fixed (as usual over the short term). It is also problematic for companies to continuously supply the market if the supply of raw materials varies widely (Dreyer & Grønhaug, 2004; Ottesen & Grønhaug, 2003). It is especially important to be able to deliver fresh fish in the fall when the supply is limited and the prices are higher (Björgvinsson, 2014). An even supply throughout the year would be more optimal for the industry, both from a cost and price perspective. The present study expects that the best performing industry will have a more evenly distributed and stable supply of whitefish throughout the year. Therefore, the following hypothesis is posited:

> ***Hypothesis 2:*** *The best performing industry is located in the nation where the supply of whitefish throughout the year is less volatile.*

Marketing strategies

Historically, the unique access to whitefish resources has been the primary competitive advantage for Iceland and Norway. However, the raw material market for fish has gradually become globalised, partly due to new freezing and thawing technology as well as cheaper transportation. As a result, international players with low labour costs and access to frozen whitefish can produce frozen fillets and outstrip Iceland and Norway on price (Egeness, 2013). Nevertheless, the geographical location of the industry plays a pivotal role for the competition since proximity to valuable fishing grounds makes it possible for the whitefish processing industry in both countries to implement fresh fish strategies and differentiate themselves from the frozen fish produced abroad (Iversen, 2003). A differentiated marketing strategy, such as the production of fresh whitefish fillets, can therefore be adequate to overcome the competition from frozen fillets since such products are difficult to duplicate by countries that cannot harvest whitefish species on their own (Dreyer & Grønhaug, 2004; Lorentzen *et al.*, 2006). Fresh whitefish fillets are more valuable than frozen fillets and fresh whole whitefish. However, producing such differentiated products comes with a cost. Nevertheless, as long as the additional revenue is greater than the cost, it will be profitable to produce fresh fillets. Therefore, the following sub-hypothesis is posited:

> ***Hypothesis 3a:*** *The best performing industry sells relatively more fresh fillets than frozen fillets.*

As discussed in the Introduction, the migration patterns of the whitefish species has resulted in seasonally based fishing in Norway due to economic reasons (Nilssen *et al.*, 2015). The season occurs during the first half of the year when most of the harvesting (of cod at least) takes place. In the second half of the year, the supply is limited, which raises the prices of fresh fillets (Björgvinsson, 2014). This may result in better profits for the producers that are able to supply the market during this time of product shortage. In Iceland in 1990, the quota year was moved

from the calendar year to a specific quota year, which lasted from 1 September to 31 August in the following year. One reason for changing the quota year was to motivate more fishing in the second half of the year. Therefore, the following sub-hypothesis is posited:

> ***Hypothesis 3b:*** *The best performing industry sells more fresh fillets in the second half of the year.*

Raw material procurement strategies

A differentiated marketing strategy (high quality/high price) requires the firms in the processing industry to be supplied with high-quality raw fish. In this regard, fishing gear employed to catch the whitefish is important. Studies have shown that high-quality raw materials provide more product options and better prices in the market (Henriksen & Sogn-Grundvåg, 2011; Henriksen & Svorken, 2011; Heide & Henriksen, 2013). In addition, whitefish caught by hook is considered more suitable for processing as fresh fillets than whitefish caught with nets (Heide & Henriksen, 2013), especially since bottom trawling, Danish seines and gillnets are more likely to damage the fish (Akse *et al.*, 2013; Rotabakk *et al.*, 2011). In the important UK retail market, a recent study showed that the attribute "line-caught" gives cod and haddock price premiums of 18% and 10%, respectively (Sogn-Grundvåg *et al.*, 2013). In some cases, customers demand that whitefish fillets are processed from line-caught whitefish (Hagfræðistofnun, 2011). Therefore, the following hypothesis is posited:

> ***Hypothesis 4:*** *The best performing industry acquires more whitefish that is caught by hook.*

Research design

This empirical study with the chosen theoretical perspective requires in-depth knowledge of the marketing and harvesting strategies pursued by the whitefish industry in Iceland and Norway. The industries must be studied over time to determine whether the attributes they possess can be sources of sustainable competitive advantages. Industries that experience a high level of uncertainty in the environment require a shorter time span for analysis than more stable industries. The chosen time period (2003–2012) exemplifies the structural turbulence in the fillet industry in Norway. In such a volatile setting, the prospects are better to uncover which strategic choices may explain the variability in the firms' performances.

In this study, the Norwegian whitefish industry constitutes one performance group and the Icelandic industry is the other. Data for the supply of raw materials in Norway at the industry level was obtained from Statistic Norway and the Norwegian Directorate of Fisheries. Similar data for Iceland was obtained from Statistic Iceland and the Directorate of Fresh Fish Prices in Iceland. Data regarding the exports of products from Norway was obtained from the Norway Seafood Council, while similar data from Iceland was acquired from the Federation of Icelandic Fish Processing Plants.

Results

In this section, the empirical findings are presented in the same order as in the analytical model (Figure 1).

Supply accessability

> ***Hypothesis 1:*** *The best performing industry has better access to the largest total volume of whitefish on a yearly basis.*

As stated in Hypothesis 1, access to whitefish is expected to be an important value driver for the fillet companies.

Table 1 Raw fish catch (in tons) for Iceland and Norway.

	Cod			Haddock			Saithe		
	Iceland	Norway	Diff.	Iceland	Norway	Diff.	Iceland	Norway	Diff.
2003	200 443	217 362	-16 919	59 984	59 329	655	51 855	212 228	-160 373
2004	220 057	230 746	-10 689	83 696	64 932	18 764	62 631	211 267	-148 636
2005	206 376	225 775	-19 399	95 839	63 337	32 502	67 274	230 567	-163 293
2006	193 404	221 299	-27 895	96 101	71 412	24 689	75 204	256 856	-181 652
2007	167 159	217 789	-50 630	108 199	73 286	34 913	64 008	225 464	-161 456
2008	143 860	215 444	-71 584	101 606	74 299	27 307	69 992	227 295	-157 303
2009	181 322	243 659	-62 337	81 388	106 324	-24 936	61 115	202 377	-141 262
2010	167 547	283 481	-115 934	63 880	124 696	-60 816	53 718	228 114	-174 396
2011	169 300	340 167	-170 867	49 316	159 550	-110 234	50 387	190 344	-139 957
2012	193 560	357 951	-164 391	45 670	160 977	-115 307	50 848	176 471	-125 623
Acc.	1 843 028	2 553 673	-710 645	785 679	958 142	-172 463	607 032	2 160 983	-1 553 951
Mean	184 303	255 367	-71 065	78 568	95 814	-17 246	60 703	216 098	-155 395
Std.	22 703	53 474	59 896	22 479	39 663	58 477	8 725	22 823	16 826
Significance*			***			-			***

Source: Statistic Iceland and Statistic Norway.

* Two-tailed t-test: Two-sample assuming equal variances. *** p < 1%.

Table 1 illustrates the yearly catch of cod, haddock and saithe in the two performance groups during the analysis period. From 2003 to 2006, Iceland caught less cod than Norway, but since 2007, Norway significantly caught more cod than its counterpart. This indicates that Norway had better supply conditions for cod on a yearly basis, while the standard deviation indicates more volatility in Norway. Overall, the cod trend for Iceland slightly decreased, whereas the trend for Norway dramatically increased.

Moreover, Table 1 shows that Iceland caught more haddock than Norway from 2003 to 2008, but since 2009, Norway gradually caught more haddock than Iceland. This indicates that Norway had better supply conditions for haddock on a yearly basis, even though Iceland had a better supply between 2003 and 2008. The standard deviation indicates more volatility in Norway on a yearly basis. As with cod, the total catch of haddock in Norway increased significantly from 2008 to 2012. The standard deviation indicates that the haddock supply in Norway was more volatile than in Iceland. Overall, the trend for Iceland slightly decreased, whereas the trend for Norway sharply increased.

Norway caught up to four times more saithe than Iceland. This indicates that Norway had significantly better supply conditions for saithe on a yearly basis than Iceland, but again, the standard deviation indicates more volatility in Norway. Overall, the trend for both countries decreased, with Norway showing a slightly steeper decrease than Iceland.

Finally, Norway caught significantly more cod and saithe than Iceland (p < 1%). However, in regard to haddock, the difference was not significant. Based on the results in Table 1, it is reasonable to reject Hypothesis 1 since the best performance group was not located in the nation where access to whitefish on a yearly basis was the highest.

Supply volatility

Hypothesis 2: *The best performing industry is located in the nation where the whitefish supply throughout the year is less volatile.*

Table 2 Monthly landing patterns of raw fish (2003–2012) for Iceland and Norway.

	Cod				Haddock				Saithe			
	Iceland	SD	Norway	SD	Iceland	SD	Norway	SD	Iceland	SD	Norway	SD
Jan	8.0%	1.0%	10.1%	2.4%	8.0%	1.6%	6.2%	2.1%	5.0%	0.6%	4.4%	0.6%
Feb	11.1%	1.4%	15.5%	2.5%	10.1%	1.4%	7.7%	2.8%	6.2%	0.9%	13.6%	2.1%
Mar	13.9%	1.3%	23.9%	3.7%	12.0%	2.0%	9.0%	2.8%	8.1%	0.7%	15.8%	1.8%
Apr	8.8%	1.2%	13.8%	2.4%	9.4%	1.3%	11.7%	1.8%	8.6%	1.6%	7.6%	1.5%
May	8.7%	1.2%	5.6%	1.2%	8.8%	1.5%	7.1%	2.2%	8.7%	2.1%	9.5%	2.3%
Jun	5.7%	0.6%	4.5%	1.1%	4.9%	1.3%	6.1%	1.5%	7.5%	2.0%	9.0%	1.5%
Jul	4.8%	0.4%	3.4%	0.7%	5.4%	1.1%	7.0%	2.6%	9.7%	2.4%	6.6%	2.4%
Aug	5.9%	0.6%	3.0%	0.7%	7.7%	2.1%	8.3%	2.2%	10.3%	1.6%	8.7%	2.0%
Sep	7.2%	1.0%	2.6%	0.6%	7.7%	0.7%	7.2%	2.1%	8.5%	2.4%	8.0%	0.6%
Oct	8.7%	1.3%	3.4%	1.0%	9.2%	1.9%	9.2%	2.9%	9.9%	1.7%	6.2%	1.7%
Nov	9.4%	1.2%	6.6%	1.2%	9.6%	2.2%	11.3%	2.5%	9.5%	1.5%	5.6%	1.5%
Dec	7.9%	0.7%	7.7%	1.4%	7.2%	1.6%	9.0%	1.2%	8.0%	1.5%	4.9%	0.8%
Sign.*				**				-				*

Source: Statistic Iceland and the Norwegian Directorate of Fisheries.

* Two-tailed t-test: Two-sample assuming equal variances. ** p < 5%, * p < 10%.

For a fillet business, the regular supply of raw materials is a prerequisite for achieving good capacity utilisation and profitable production (Lorentzen *et al.*, 2006). Table 2 presents the monthly landing patterns of the three main whitefish spices for the two performance groups.

Table 2 indicates that the supply of cod was significantly (p < 5%) more stable in Iceland throughout the year than in Norway. In addition, Norway's catch of cod mainly occurred in the first half of the year. In fact, approximately 73% of the total catch for the year occurred during this time period. In Iceland, approximately 56% of the total catch was landed in the first half of the year, which supports the indication that Iceland has a more stable supply of cod throughout the year. The standard deviations of the mean supply of cod was roughly 2.5% for Iceland and 6.5% for Norway.

Table 2 does not indicate whether Iceland or Norway had a more stable supply of haddock throughout the year. Iceland's catch of haddock in the first half of the year was approximately 53% of the total catch, while that for Norway was 48%. The standard deviation of the mean supply of haddock was around 2% for Iceland and approximately 1.8% for Norway.

Morover, Table 2 indicates that Iceland had significantly (p < 10%) more stable supplies of saithe throughout the year. Norway's catch of saithe in the first half of the year was approximately 60% of the total catch for the year, while for Iceland, it was roughly 44%. The standard deviations of the mean supply of saithe was approximately 1.5% for Iceland and 3.4% for Norway, which might indicate that Iceland had better supply conditions for saithe throughout the year.

Finally, Table 2 shows that both performance groups utilised raw materials according to season-based fishing. However, the firms in the best performance group experienced significantly less seasonal variation for cod and saithe than the weakest performing group, while there was no significant difference for haddock. Based on these results, it is reasonable to affirmatively respond to Hypothesis 2 since the best performance group had a more stable supply of raw materials throughout the year.

Table 3 Annual sales volumes (in tonnes) of fresh and frozen fillets for Iceland and Norway.

	Cod						Haddock						Saithe					
	Volume fresh			Volume frozen			Volume fresh			Volume frozen			Volume fresh			Volume frozen		
	Iceland	Norway	Diff.	Iceland	Norway	Diff.	Iceland	Norway	Diff.	Iceland	Norway	Diff.	Iceland	Norway	Diff.	Iceland	Norway	Diff.
2003	7 830	1 948	5 882	21 938	23 454	-1 516	2 628	765	1 863	5 136	6 570	-1 434	198	1 431	-1 233	5 796	16 360	-10 564
2004	11 336	3 056	8 280	24 373	20 620	3 753	4 017	1 416	2 601	7 124	6 454	670	197	2 066	-1 869	7 330	14 557	-7 227
2005	11 131	4 197	6 934	21 623	19 947	1 676	6 323	1 691	4 632	7 345	5 461	1 884	196	2 069	-1 873	7 423	15 630	-8 207
2006	11 467	4 776	6 691	21 098	18 953	2 145	6 818	1 420	5 398	6 560	6 432	128	270	1 833	-1 563	8 186	12 694	-4 508
2007	8 973	4 770	4 203	20 072	15 184	4 888	6 076	1 141	4 935	8 243	4 981	3 262	176	2 068	-1 892	7 574	10 176	-2 602
2008	8 849	4 434	4 415	10 693	14 327	-3 634	6 460	1 211	5 249	6 651	6 223	428	368	1 250	-882	6 391	14 330	-7 939
2009	13 129	7 037	6 092	90 44	15 331	-6 287	5 809	1 021	4 788	5 836	9 784	-3 948	656	573	83	5 919	6 852	-933
2010	13 113	6 416	6 697	10 344	20 087	-9 743	4 882	1 711	3 171	6 977	10 370	-3 393	1 303	787	516	6 432	7 195	-763
2011	13 346	5 708	7 638	18 205	17 615	590	4 142	1 519	2 623	5 820	8 944	-3 124	1 321	351	970	6 448	4 287	2 161
2012	16 566	5 409	11 157	16 681	14 629	2 052	4 202	1 660	2 542	4 622	7 225	-2 603	1 001	219	782	5 566	4 015	1 551
Acc.	115 740	47 751	67 989	174 071	180 147	-6 076	51 357	13 555	37 802	64 314	72 444	-8 130	5 686	12 647	-6 961	67 065	106 096	-39 031
Mean	11 574	4 775	6 799	17 407	18 015	-608	5 136	1 356	3 780	6 431	7 244	-813	569	1 265	-696	6 707	10 610	-3 903
Std.	2 610	1 508	1 991	5 514	3 086	4 669	1 366	315	1 340	1 087	1 832	2 448	471	739	1 169	871	4 731	4 441
Sign.			***			-			***			-			**			**

Source: Statistic Iceland and the Norwegian Directorate of Fisheries.

* Two-tailed t-test: Two-sample assuming equal variances. *** p < 1%, ** p < 5%.

Marketing strategy

Hypothesis 3a: *The best performing industry sells relatively more fresh products than frozen ones.*

Hypothesis 3a expects that the volumes of differentiated fish products sold will be an important value driver for the fillet companies.

Table 3 presents the total volume of exported fresh and frozen fillets (in tonnes) on a yearly basis for Iceland and Norway, respectively. The Icelandic industry exported significantly more fresh cod fillets compared to the Norwegian industry (p < 1%). However, it varied when considering the nation that exported the most frozen cod fillets. The Icelandic industry exported significantly more fresh haddock fillets during the study period (p < 1%), while the result for the frozen haddock fillets was not significant. In addition, the Norwegian industry exported significantly (p < 5%) more fresh saithe fillets than the Icelandic industry. However, since 2009, the Icelandic industry exported even more fresh saithe fillets than the Norwegian industry. For the frozen fillets, the Norwegian industry exported significantly more (p < 5%) than Iceland. Based on the results presented in Table 3, it is reasonable to accept Hypothesis 3a since the best performance group sells significantly more fresh products than frozen ones.

Hypothesis 3b: *The best performing industry sells more fresh fillets in the second half of the year.*

Table 4 shows that the Icelandic industry exported significantly more (p < 1%) fresh cod and fresh haddock fillets in the second half of the year during the study period. However, the Norwegian industry exported more fresh saithe fillets from 2003 to 2008 until the Icelandic industry exceeded Norway in 2009.

Based on the results in Table 4, it is reasonable to accept Hypothesis 3b since the best performance group sold significantly more fresh fillets in the second half of the year than the other performance group.

Table 4 The total volume of fresh fillets exported in the second half of the year for Iceland and Norway.

	Cod			Haddock			Saithe		
	Iceland	Norway	Diff.	Iceland	Norway	Diff.	Iceland	Norway	Diff.
2003	4 273	630	3 643	1 274	594	680	83	800	-717
2004	6 364	806	5 558	1 803	1 047	756	96	1 068	-972
2005	5 847	1 332	4 515	3 304	800	2 504	83	954	-871
2006	5 161	1 646	3 515	3 062	738	2 324	99	786	-687
2007	4 482	1 698	2 784	3 030	571	2 459	75	849	-774
2008	3 878	1 816	2 062	2 605	642	1 963	208	624	-416
2009	6 748	2 815	3 933	2 417	596	1 821	337	327	10
2010	6 486	1 961	4 525	2 118	1 134	984	774	333	441
2011	7 440	1 709	5 731	1 985	851	1 134	583	231	352
2012	8 983	1 799	7 184	1 608	979	629	502	152	350
Accumulated	59 662	16 212	43 450	23 206	7 952	15 254	2 840	6 124	-3 284
Mean	5 966	1 621	4 345	2 321	795	1 525	284	612	-328
Std.	1 578	611	1 510	678	203	768	254	327	560
Sign. two-tail*			***			***			**

Sources: Norway Seafood Council, Federation of Icelandic Fish Processing Plants.

* Two-tailed t-test: Two-sample assuming equal variances. *** p < 1%, ** p < 5%.

Table 5 Catch of whitefish supplied by different fishing gears in Iceland (2003–2012) and in Norway (2005–2012). Source: Statistic Iceland and the Norwegian Directorate of fisheries.

	Iceland		Norway		
Cod	Mean	SD	Mean	SD	Sign.
Trawl	44.7%	1.7%	31.4%	1.3%	***
Gillnet	11.4%	2.4%	28.7%	1.8%	***
Hand and Long lines	37.5%	1.2%	23.1%	1.2%	***
Danish seine	5.2%	0.4%	16.7%	0.5%	***
Other	1.2%	0.5%	0.1%	0.0%	***
Haddock	Mean	SD	Mean	SD	
Trawl	49.0%	3.7%	46.7%	7.5%	-
Long line	35.5%	3.5%	34.5%	4.2%	-
Danish seine	14.0%	2.5%	14.7%	3.5%	-
Other	1.5%	0.4%	4.1%	1.7%	***
Saithe	Mean	SD	Mean	SD	
Trawl	83.2%	4.6%	51.8%	4.8%	***
Purse seine	(<0,1%)	(<0,1%)	23.2%	4.3%	***
Gillnet	7.8%	3.4%	17.0%	2.9%	***
Hand and Long lines	6.2%	1.9%	4.4%	0.8%	**
Other	2.8%	0.9%	3.6%	0.7%	*

Raw material procurement strategy

Hypothesis 4: *The best performing industry acquires more whitefish that is caught by hook.*

To be able to sell differentiated high-quality fresh fillets to customers, the best performance group is expected to acquire relatively more whitefish caught by hook.

Table 5 presents the catch supplied by various fishing gear for the two performance groups in the study period. Trawling, hand line fishing (possibly jigging) and long line fishing were used significantly more ($p < 1$ %) in Iceland to catch cod than in Norway. Conversely, gillnets and Danish seines were used more in Norway compared to Iceland ($p < 1$ %). For haddock, the main fishing gears were used in a similar scale in both nations. For saithe, trawling was primarily used in Iceland, while in Norway, it was more divided between trawling, gillnets and purse seine fishing.

Based on the results in Table 5, it seems reasonable to partially accept Hypothesis 4, which states that the best performance group acquires more whitefish that is caught by hook. The reason being that hand and long lines were used significantly more ($p < 1$ %) in Iceland to catch cod (the most valuable species). However, in regard to haddock and saithe, the differences are minor.

Discussion

This study examined whether the Icelandic and Norwegian firms pursue different marketing and harvesting strategies in order to maximise their take of one of the region's most valuable natural resources, namely whitefish, and export their products to the same global markets. This section considers the types of competitive advantages that might exist among the Icelandic firms compared to the Norwegian firms. Moreover, we will consider the imitability of any competitive advantages identified.

The resource accessibility advantage

The Norwegian industry had better access to whitefish than Iceland for all three species examined during the study period (see Table 1). This advantage may be rooted in better biological factors, improved fishery management or the combination of both. Biological factors are not duplicable nor are fishery management (at least in the short term). Therefore, we can conclude that Norway had an accessibility advantage over Iceland in regard to whitefish resources. However, the Norwegian industry failed to convert this sustainable accessibility advantage into better financial performance.

The resource stability advantage

A more even supply of whitefish may lead to increased utilisation of production capacity and also enable the firms to continuously supply the market. The monthly landing pattern of cod and saithe throughout each year deviated significantly less in Iceland (from optimal landing patterns) than in Norway (see Table 2). For haddock, the difference was not significant. These results indicate that Iceland had an advantage when it came to the supply of whitefish throughout the year, although both nations pursued seasonal-based cod fishing during the winter (Nilssen *et al.*, 2015; Knutsson *et al.*, 2011).

This resource stability advantage may also be rooted in biological factors or in improved fishery management. The migration patterns of the different whitefish species are a biological factor that cannot be duplicated, thus indicating that the stability advantage is sustainable. If the landing pattern in Iceland is partly motivated by the Icelandic quota year starting 1 September, this is an administrative decision that can also be initiated in Norway. To conclude, we consider Iceland to have a sustainable stability advantage over Norway when it comes to raw material access throughout the year. However, this advantage is also difficult to duplicate. Moreover, the Icelandic industry managed to convert the resource stability advantage into better profitability by selling more fresh fillets in the second half of the year when the supply was limited and the prices were higher (see Table 4).

The marketing strategy advantage

The best performance group (Iceland) created superior values by pursuing a differentiation marketing strategy. In addition, Iceland had a stronger focus than Norway on selling more fresh fillets (see Table 3), especially in the second half of the year when the supply was limited and the prices were higher (see Table 4).

Fresh fillets are, however, vulnerable to the number of days that they can sit on store shelves until they are consumed (Heide & Henriksen, 2013). In this regard, high-quality raw materials have the potential of a longer shelf life than low-quality raw materials (ibid.). Moreover, by using air transportation, products can arrive faster to the market, but this speed advantage comes at a higher cost (Jónsdóttir, 2011). In general, fresh whitefish fillets from Iceland are mainly exported by air (Hagfræðistofnun, 2011), while fresh whitefish fillets from Norway are primarily exported by lorries (Egeness *et al.*, 2011).

As long as there is a steady or increasing demand for fresh whitefish fillets from customers with high purchasing power, the differentiating strategy is sustainable (Henriksen & Sogn-Grundvåg, 2011; Henriksen & Svorken, 2011; Heide & Henriksen, 2013). As discussed in the following paragraphs, the differentiating strategy will require pivotal managerial and political actions from Norwegian authorities for the industry to duplicate the Icelandic market-oriented approach.

The procurement strategy advantage

In general, whitefish caught by hook is considered to be of higher quality than fish caught with nets (Akse *et al.*, 2013; Heide & Henriksen, 2013). Line-caught cod and haddock also gain substantial price premiums in the important UK retail market (Sogn-Grundvåg *et al.*, 2013). As a result, the performance group that can acquire more whitefish caught by hook is expected to have an advantage when it comes to the quality of the raw materials. This would also be a prerequisite for pursuing a differentiation marketing strategy based upon fresh, high-quality fillets. This argument is in line with Nilssen *et al.* (2015) who found that the best performing Norwegian firms acquired more fish caught by hook than firms that performed poorly. Moreover, the results reveal that hooks were used on a larger scale to harvest cod in Iceland compared to Norway (see Table 5). In addition, Icelandic firms had significantly better access to cod, which was caught by hook, throughout the year compared to the Norwegian industry (Björgvinsson, 2014).

The Icelandic firms seemed to pursue a procurement strategy that gave indispensable support to their differentiated marketing strategy. However, the procurement strategy and the marketing strategy were also constructively aligned by the Norwegian industry in that a low-price marketing strategy (exporting significant more whole frozen fish than Iceland (ibid.)) was aligned with a procurement strategy mainly based on the use of nets (see Table 5). Nevertheless, Nilssen *et al.* (2015) disclosed that the best Norwegian firms increasingly acquired more raw materials by hook. Therefore, the quality-focused procurement strategy of Iceland may be duplicable in the long term.

Conclusion

This study was motivated by the question of why sustainable performance differences occur among the same type of industry located in different countries. Based on previous studies (Björgvinsson 2014; Grimsmo & Digre, 2012; Íslandsbanki, 2012; NOU 2014:16), we concluded that the industry of Iceland was the better performer. The profit differences also indicate that the industry in one nation had gained competitive advantages over the industry in the other nation.

The results also revealed that the Icelandic industry had a significant resource accessibility disadvantage in regard to whitefish supplies over the years. This disadvantage was considered as sustainable since it was partly rooted in biological factors. This disadvantage was, however, turned into a significant advantage when it came to the landing patterns of the catches throughout the year (except for haddock). With more stable supply conditions, the foundation

may have been laid for better capacity utilisation, which, in turn, paved the way for a more profitable production by the Icelandic firms. Since the stability advantage was at least partly rooted in biological factors (e.g. the migration patterns of the species), it was considered difficult to duplicate.

The Icelandic industry pursued a differentiation marketing strategy that involved processing and selling relatively more fresh whitefish fillets than the Norwegian industry. Moreover, the supply conditions throughout the year enabled the Icelandic industry to supply the market on a more continuous basis. The firms in Iceland did, to a greater extent, pursue a procurement strategy of acquiring high-quality whitefish caught by hook, thus supporting their differentiation marketing strategy. This was true, especially for cod and haddock.

To summarise, in the Icelandic industry, it appears that the firms' differentiation and procurement strategies were constructively aligned to maximise profits throughout the entire industry. The Icelandic firms' more complex structures (Björgvinsson, 2014) were supported by an institutional framework, which allowed the industry to vertically integrate to secure the raw materials and diversify in order to reduce the operational risk of only reaping demersal species (ibid.).

Managerial implications

For Norwegian firms, the findings that the Icelandic firms have implemented strategies to process and export more fresh whitefish fillets from lower volumes indicates that it makes sense to pursue a similar differentiated marketing strategy (combined with a high-quality procurement strategy) and reduce the export of fresh and frozen unprocessed whitefish. This view is supported by a detailed study of profitability drivers among Norwegian processing firms (Nilssen *et al.*, 2015). However, the access of fresh cod throughout the year is unfavourable for the Norwegian industry. Therefore, more focus on fresh haddock and saithe fillets during times when cod supplies are scarce could be important for keeping processing plants in operation throughout the year.

Political implications

According to Björgvinsson (2014), the Icelandic firms that had a more complex structure (integrated and/or diversified) were more profitable than firms with a less complex structure, including the Norwegian firms. For the Norwegian industry to become more profitable, they may need to develop similar firm structures that support a more market-oriented approach. This would, however, require pivotal steps to be taken by the Norwegian authorities.

The Participation Act must be changed to allow processing firms to operate their own harvesting vessels with quotas that support their land-based plants. The benefit of such a change would be that the firms will gain more control over their supply chain, which may improve their performance (Prajogo & Olhager, 2012). In addition, better control over the supply chain may make it easier to enter into long-term contracts with buyers of whitefish products abroad (ibid.).

In order to change the Participation Act, it will require political leadership since the Marine Resource Act of 2008 stated that wild living marine resources are owned by the Norwegian fellowship, just as the Fisheries Management Act of 2006 in Iceland stated that wild living marine resources are owned by the Icelandic fellowship. One solution could be to operate an individual vessel quota (IVQ) system, which is currently practised in Norway, instead of changing the IVQ system to an individual transferable quota (ITQ) system, which is practised in Iceland. The Norwegian government had the opportunity to legalise an ITQ system when the IVQ system was presented in 1990, but it rejected the possibility since it believed that the quotas would end up in the hands of the privileged few (Hersoug *et al.*, 2000; Standal & Aarset, 2008). However, if it is a political objective that the Norwegian firms should become more profitable, then a major step could be to allow the firms to operate their own harvesting vessels under an IVQ system in order to control their supply chain through a more market-oriented approach, as seen in Iceland.

Finally, for the Norwegian firms to pursue a differentiation marketing strategy that focuses

on processing fresh whitefish fillets in line with what is practised in Iceland, they will need access to fresh, high-quality whitefish harvested by hook (Akse *et al.*, 2013; Heide & Henriksen, 2013; Rotabakk *et al.*, 2011). To support such a strategy, it would be favourable if more quotas were allocated to vessels that use hooks. Moreover, moving the quota year in Norway could lead to more fishing in the second half of the year (when cod fishing is limited) since most of the quotas were already met in the first half of the year (when the fish were easily available due to their spawning season).

Theoretical implications

The results of this study highlight the importance of integrating the perspective of the resource-based view on strategy that focuses on firms' resources (Barney, 1991) and the comparative view of strategy, which focuses on national resource differences (Luo *et al.* 2011). The empirical findings indicate that national environmental differences (i.e. how fishing licenses are distributed and the vertical and horizontal coordination of the value system) can impact the chosen strategies and provide performance implications. However, such environmental differences are not sustainable since other nations are able to copy them by developing the same institutional environmental settings.

However, national capability differences might create sustainable competitive advantages since they are difficult to copy, as illustrated by our findings when comparing the strategies chosen in Norway and Iceland. If the success of Icelandic producers is rooted in the migration patterns of the fish (i.e. the fish is accessible close to shore during the entire year), then the Norwegian processors are doomed to be in a weak position when it comes to serving the most valuable customers that demand high-quality fresh fish throughout the year. Our observations indicate that the integration of the resource-based view of the firm (Barney, 1991) and the comparative view of nations (Luo et al, 2011) is an interesting path to follow in order to obtain a better understanding of the relationship between strategy alignment and differences in firm performance.

Limitations and further studies

This empirical study, based on comprehensive research questions, clearly places limitations on what can be examined mainly due to limited data access and other resource constraints. In addition, we have limited our focus to factor conditions and firm strategies, as discussed in the theoretical framework of the competitive advantage of nations (Porter, 1990). Furthermore, no attempt was made to include domestic demand conditions or related industries in this research (see Figure 1). Since most of the fish products from both Iceland and Norway are exported to global markets, domestic demand was not regarded as a significant part of the whitefish fillet industry. Finally, it was concluded that it would be too comprehensive and complex to include related industries in this study.

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Hvilken råstoffstrategi er mest lønnsom for norske filetbedrifter?

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Sammendrag på norsk:
I artikkelen spør vi først om det er forskjeller i lønnsomheten til de få gjenværende filetbedriftene i Norge. Dette får vi bekreftet ved å analysere ti år med regnskapsdata for hele populasjonen. Deretter spør vi om variasjonen i lønnsomheten kan knyttes til bedriftenes valg av råvareleverandører. Våre resultater viser at bedriftene som har den høyeste andelen ferskt kvalitetsråstoff, oppnår bedre lønnsomhet enn de som bruker mer frossen fisk. Til slutt diskuterer vi mulige forklaringer og implikasjoner av funnene.

Abstract in English:
In this article we address the relation between profitability and strategies to cope with input uncertainty in the Norwegian filleting industry. By analyzing firms internal financial statements in a period of 10 years we find that some firms perform over average compared to its competitors. These firms are said to have a competitive advantage. We group the firms according to their relative performance, and we find that the best performing group is supplied with high quality fresh fish. Finally, the article discusses implications of the findings, both on a managerial and theoretical level.

Innledning

I strategifaget pågår det en kontinuerlig debatt om sammenhengen mellom strategiske valg og økonomisk prestasjon. En bedrift må ha skaffet seg fortrinn skal den prestere bedre enn konkurrentene over tid. I følge Porter (1980;1985) kan en bedrift oppnå konkurransefortrinn ved å tilpasse seg omgivelsene gjennom å minimere eksterne trusler og unytte muligheter. Barney derimot (1991; 2007), legger til grunn at det kan være store prestasjonsforskjeller mellom aktører i samme næring. Årsaken er at hver enkelt aktør sitter på ulike ressursporteføljer (sterke/svake sider), og at det er disse som danner grunnlaget for varige fortrinn.

De siste tiårene har konkurransearenaene blitt utsatt for større usikkerhet. Drivkrefter som globalisering, teknologi og innovasjoner har katalysert utviklingen i en rekke bransjer (Dreyer & Grønhaug, 2004). Endringer i omgivelsene kan skje hurtig, og bedriftenes ressursmessige forutsetninger vil variere. Det noen ser på som trusler, vil for andre kunne være muligheter. Dette gir rom for ulike strategiske tilpasninger.

Et godt eksempel på dette er norsk fiskeindustri, spesielt den delen som produserer filet av hvitfisk, det vil si torsk, hyse og sei. Strukturendringene har vært voldsomme, og mange ser på denne delen av næringen som «en sammenhengende krise» (Finstad *et al.*, 2012). Røde tall og stort frafall har kjennetegnet bransjen. Antall filetbedrifter fra storhetstiden på 1970-tallet og frem til 2012 er redusert fra cirka 100 til 10.

I bunnen ligger naturgitte utfordringer knyttet til fiskens biologi. Artenes vandringsmønster og tilgjengelighet har gjort det lønnsomt med et sesongbasert fiske. Videre har teknologi- og logistikkløsninger endret konkurransebetingelsene for norske filetbedrifter. Internasjonale aktører med

lave arbeidskraftkostnader har meldt seg på i kampen om fryst råstoff og løftet det som en gang var et lokalt råstoffmarked til et globalt råstoffmarked (Bendiksen & Dreyer, 2002; Bendiksen, 2009). Endringene i konkurransebetingelsene har vært vanskelige å håndtere for norske filetbedrifter. En oljesmurt økonomi med et høyt kostnadsnivå og en alt for sterk valuta har også bidratt negativt til en allerede presset industri (Holm *et al.,* 2013).

Tidligere studier har likevel vist at blant de gjenværende bedriftene er det noen som leverer bedre økonomiske resultater over tid enn andre (Dreyer, 1999; Isaksen *et al.*, 2004). Med forankring i litteraturen og egen empiri ønsker vi å studere om det fortsatt fins bedrifter i norsk filetindustri som ligger i front med tanke på økonomisk prestasjon. Hvis dette er tilfellet, har vi en intensjon om å avdekke sentrale egenskaper som kan være kilder til konkurransefortrinn hos de beste bedriftene.

Artikkelen fortsetter med en gjennomgang av strategilitteratur som kan belyse hvorfor enkelte bedrifter oppnår bedre økonomiske resultater enn andre. Deretter redegjør vi for forskningsdesignet vårt og valg av empirisk setting. Så følger resultater og diskusjon. Til slutt drøfter vi implikasjoner av funnene våre.

Teori

I artikkelen retter vi altså oppmerksomheten mot om, og i så tilfelle hvorfor enkelte bedrifter presterer bedre enn andre. Ulike teoretiske tilnærminger forsøker å forklare lønnsomhetsforskjeller. En retning leter etter begrunnelser i trekk ved konkurransearenaen (Porter, 1980; 1985), mens en annen hovedretning, vektlegger bedriftsinterne egenskaper (Barney, 1991). Vi vil forsøke å forklare lønnsomhetsforskjeller mellom bedrifter ved å kombinere disse to perspektivene. Samtidig har vi tatt konsekvensen av at et slikt integrert perspektiv er metodisk utfordrende fordi det krever inngående kunnskap både om konkurransearenaen og hvilke egenskaper hver enkelt bedrift i bransjen besitter.

Omgivelsesteori, med røtter tilbake til klassisk økonomi og industriell organisering, er én teoriretning som har fått mye oppmerksomhet siden 1980-tallet. Her argumenteres det for at strategiske valg og prestasjoner i stor grad er avhengige av egenskaper ved bransjen bedriften er en del av. En fundamental forutsetning er at den viktigste driveren til lønnsomhet ligger på industrinivå. Vi kan kartlegge lønnsomhetspotensialet til en næring ved å analysere den ved hjelp av fem krefter – 1) rivalisering mellom konkurrenter, 2) trusler fra inntrengere, 3) trusler fra substitutter og forhandlingsmakten til 4) leverandører og 5) kunder (Porter, 1979).

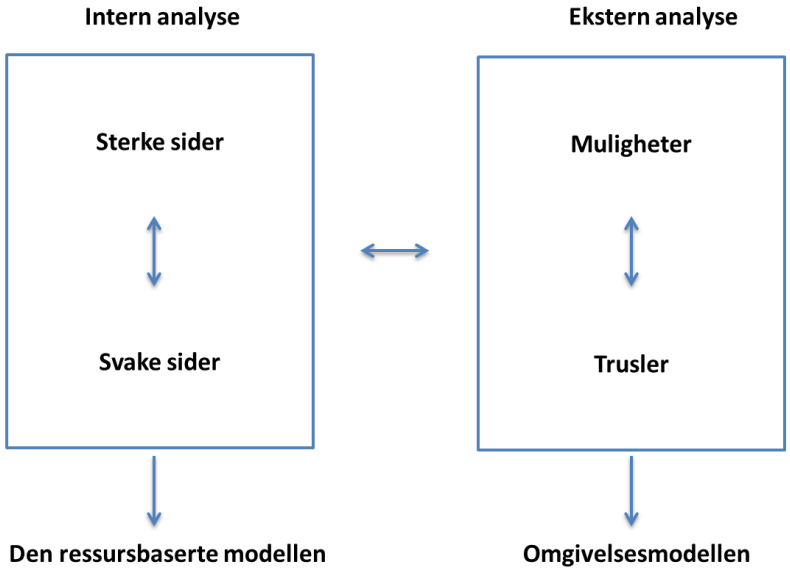
Omgivelsesteori bygger på implisitte forutsetninger i den neoklassiske tradisjonen om at bedriftene er homogene med tanke på ressursene de besitter og strategiene de velger. Her vil heterogenitet bare være midlertidig fordi ressurser kan kjøpes og selges fritt i et faktormarked (Barney, 1991). En bedrift kan oppnå ekstraordinær lønnsomhet (superprofitt) enten ved å være kostnadsleder, eller ved å differensiere seg – det vil si produsere varer og tjenester som kundene er villige til å betale en ekstra høy pris for.

Det *ressursbaserte perspektivet* vokste frem som en rival til posisjoneringsskolen og dens forklaring på konkurransefortrinn. Omgivelsesteorien ble kritisert for å forutsette at bedriftene baserer sine strategiske valg på samme informasjon om konkurransearenaen og at denne informasjon blir tolket likt. Omgivelsesteorien forutsetter dessuten at alle bedriftene i populasjonen har lik tilgang på ressurser (Barney, 1991). En konsekvens av disse forutsetningene er at bedriftene implementerer identiske strategier slik at forskjeller i lønnsomhet vil bli visket ut over tid.

Analysenivået til det ressursbaserte perspektivet er bedriften og dens ressurser. Forskjeller i lønnsomhet avgjøres av hvilke bedriftsspesifikke ressurser som til enhver tid er tilgjengelig (Grant, 1991). Et viktig

poeng er altså at bedrifter har ulike forutsetninger til å velge og implementere strategier fordi ressurser kan være heterogene og vanskelige å kopiere. Strategivalg som foretas med utgangspunkt i verdifulle ressurser med begrenset mobilitet, kan derfor være kilder til konkurransefortrinn.

Litteraturgjennomgangen vår har vist at valg av teoretisk perspektiv avgjør hvilke faktorer som blir lagt til grunn for å forklare hvorfor bedrifter presterer ulikt. Tidligere empiriske studier har forsøkt å kaste lys over perspektivenes evne til å forklare fenomenet ved å måle effekten av prestasjonsforskjeller på industri- og bedriftsnivå. Schmalensee (1985) fant i en sammenlignende studie at industrieffekten var viktigst. På den andre siden fant Rumelt (1991) at bedriftseffekten er signifikant og viktig for å forklare lønnsomhetsforskjeller. De empiriske studiene indikerer derfor at både industri- og bedriftsspesifikke egenskaper vil kunne påvirke bedriftenes prestasjoner. Ved å integrere omgivelsesteori og ressursteori vil vi kunne kontrollere for en rekke faktorer som blir utelatt ved bare å benytte ett av perspektivene. I sin aller enkleste form vil det å kombinere perspektivene utgjøre hver sin del av SWOT-rammeverket (se Figur 1).



Figur 1 *Sammenhengen mellom den ressursbaserte analysemodellen og industrimodellen for analyse av konkurransefortrinn (Barney, 1991)*

De to teoriretningene forklarer prestasjonsforskjeller med utgangspunkt i konkurransefortrinn. Modellen i Figur 1 indikerer at konkurransefortrinn kan skapes internt i bedriften (sterke/svake sider) eller på konkurransearenaen (muligheter/trusler). Perspektivene er komplementære ved at de forsøker å forklare prestasjonsforskjeller ved å benytte ulike analysenivåer. Det ene perspektivet utelukker derfor ikke det andre (Barney, 1991).

Både posisjoneringsskolen og det ressursbaserte perspektivet presiserer at aktørene må ta hensyn til usikkerhet i omgivelsene når de utformer strategier (Dreyer, 1999). De to perspektivene gir imidlertid ulike anbefalinger på hvordan usikkerhet kan håndteres. Posisjoneringslitteraturen har en mer proaktiv tilnærming der bedriften aktivt forsøker å kontrollere usikkerhet gjennom koordinering internt i verdikjeden (Porter, 1980). Dette er ikke en like rigid anbefaling i det ressursbaserte perspektivet. Bedrifter må i følge denne teoriretningen velge strategier som balanserer egne forutsetninger opp mot hvilke utfordringer som råder på konkurransearenaen (Isaksen *et al.*, 2004). Her kan andre til-

nærminger, som aktiv bruk av markedet, fungere godt.

Isaksen *et al.* (2004) har vist at det ikke er en direkte relasjon mellom hvordan usikkerhet håndteres og prestasjoner i filetindustrien. Både vertikal integrering og fleksibel bruk av markedet kan gi gode økonomiske resultater. Uansett er det viktig å forstå konkurransearenaen og implementere strategier som utnytter bedriftens sterke sider og beskytter mot svake. Ofte er det avstand mellom hva som ses på som en optimal løsning, og hva som er praktisk mulig å gjennomføre for en bedrift. Dette er et annet viktig poeng. I så fall er strategiske valg et kompromiss mellom det optimale og bedriftens ressursbegrensninger. Med denne erkjennelsen i bakhånd vil vi i denne studien forsøke å svare empirisk på følgende forskningsspørsmål:

> *Har de beste bedriftene interne sterke sider som bidrar til at de i større grad klarer å utnytte muligheter og unngå trusler i usikre eksterne omgivelser?*

Forskningsdesign

Forskningsdesignet til en empirisk studie med vårt teoretiske perspektiv fordrer inngående kunnskap om muligheter og trusler i de eksterne omgivelsene. Designet krever også at vi får til å utvikle gode mål på bedriftenes ressursposisjon, det vil si deres sterke og svake sider. Til slutt trenger vi et datasett med samtlige bedrifter i populasjonen over en periode som dekker begrepet varig.

Industrieffekten (eksterne muligheter og trusler)

Omgivelsesteori krever inngående kunnskap om konkurransearenaen som skal studeres. Det er viktig at omgivelsene er mest mulig like for bedriftene som blir sammenlignet. Dette tar vi hensyn til i studien vår ved å rette fokuset mot én industri (Miller & Shamsie, 1996). Slik kontrollerer vi for industrieffekten som i følge Porter (1980) er avgjørende for bedriftenes lønnsomhet.

Bedriftenes ressursposisjoner (interne sterke og svake sider)

I følge ressursperspektivet er det behov for gode mål på enkeltbedriftenes ressursposisjon (Dreyer, 1999). Tidligere empiriske studier med et slikt perspektiv har ofte vært av casetypen (Barney & Clark, 2007). Litteraturen anbefaler et sammenlignende design for å unngå svakhetene ved caseanalyser (Reed & DeFillippi, 1990). I vår studie blir hele populasjonen inkludert for å kartlegge om det fins bedrifter med økonomiske resultater som kan indikere varige konkurransefortrinn. Videre vil vi dele populasjonen i tre grupper etter et økonomisk prestasjonsmål. Når vi deretter sammenligner prestasjonsgruppene, håper vi å kunne forklare hvilke sterke sider de har som skaper ulik lønnsomhet.

«Varig»

Bedriftene må studeres over tid for å kunne avgjøre om egenskapene de besitter kan være kilder til varige konkurransefortrinn. Tidsperspektivet er betinget av industristrukturens dynamikk. Næringer med stor usikkerhet i omgivelsene krever en kortere analyseperiode enn mer stabile industrier. En viktig intensjon med vår studie er å undersøke én industri med hyppige og uforutsigbare endringer i omgivelsene. Vi har funnet at en periode på ti år (2002–2011) er tilstrekkelig til å favne begrepet varig i vår kontekst.

Empirisk kontekst

Vi har forsøkt å etterkomme kravene til et utfordrende forskningsdesign gjennom valg av empirisk kontekst. Settingen vi har valgt er norsk fiskeindustri som driver produksjon av hvitfiskfilet. Aktørene i filetindustrien kjøper, videreforedler og selger fisk i form av filetprodukter (Bendiksen, 2013). Populasjonen er geografisk avgrenset til bedrifter i Norge, og består av få heterogene

enheter når det gjelder størrelse, lokalisering og prestasjoner.

Ekstern trussel – biologiske forhold skaper en ujevn ressurstilgang

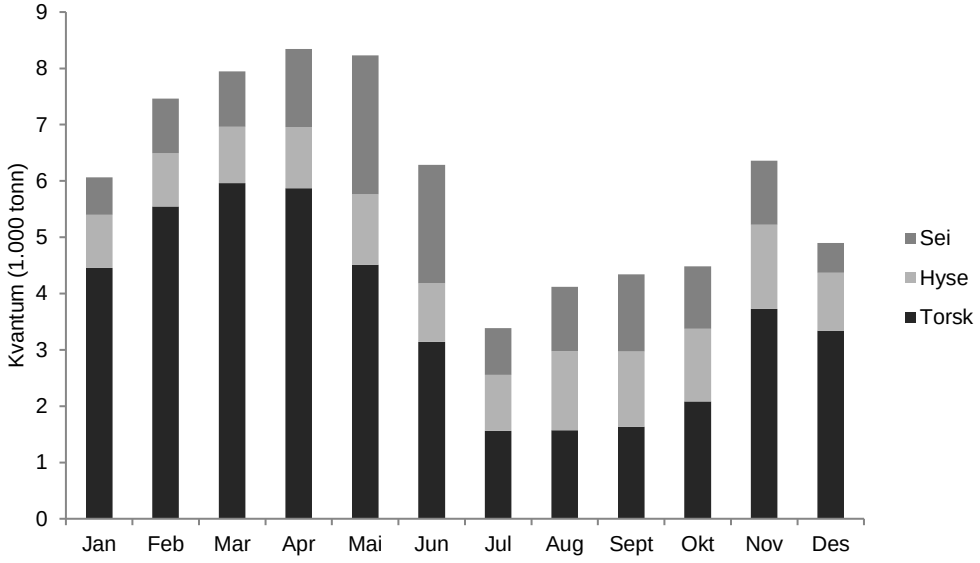
Industrien baserer produksjonen på et råstoff som er hentet fra en vill fiskeressurs. Ressurstilgangen er basert på biologi og abiotiske faktorer som er påvirket av «state uncertainty» (Milliken, 1987). Det vil si forhold som er vanskelig å styre og kontrollere av bedriftene. Forvaltningstiltak er implementert for å begrense de årlige svingningene i fangstuttaket. For de tre viktigste bestandene – torsk, hyse og sei – er det fastsatt høstingsregler som skal sikre at de årlige kvotene ikke endres mer enn en gitt prosent i forhold til foregående år. Likevel er det knyttet usikkerhet til størrelsen på det årlige fangstuttaket. I analyseperioden 2002–2011 var den største torskekvoten 724 tusen tonn, mens den minste bare var på 435 tusen tonn (Fiskeri- og kystdepartementet, 2012).

De årlige kvotesvingningene er imidlertid ikke det største problemet for bedriftene (Isaksen, 2007). Variasjon i landingene over året er en enda større utfordring for aktørene (ibid.) Figur 2 viser at det er en tydelig fangsttopp i vintermånedene for den viktigste arten torsk. Noe av variasjonen dempes imidlertid av hyse- og seifangster andre perioder i året. Likevel svinger leveransene fortsatt betydelig over året.

Fiskens vandringsmønster (tilgjengelighet), størrelse og biologiske svingninger i kvalitet tvinger fram en sesongbasert logikk (Hermansen & Dreyer, 2010) som skaper økonomiske utfordringer for bedriftene i filetindustrien. Det er vanskelig å få utnyttet produksjonskapasiteten optimalt, og det er også utfordrende for bedriftene å være leveringsdyktige i markedet til en hver tid.

Eksterne trusler – økt global konkurranse både i råvare- og forbrukermarkedene

Med introduksjonen av frysetrålere ble det likevel mulig for filetbedriftene å jevne ut sesongvariasjonene til en viss grad. Utover 1990-tallet og frem til i dag har imidlertid ny teknologi- og logistikkløsninger globalisert råvaremarkedet for frosset råstoff (Dreyer, 2000; Bendiksen & Dreyer, 2002). Internasjonale aktører med lave arbeidskraftkostnader har tilgang til dette markedet og kan utkonkurrere norske filetbedrifter på pris (Iversen, 2003).



Figur 2 Sesongprofil på leveransene av torsk, sei og hyse til filetbedriftene som deltar i denne studien i perioden 2002 til 2011 (Kilde: Fiskeridirektoratet og Driftsundersøkelsen)

Norske filetbedrifter prøver å møte den tøffe internasjonale konkurransen ved å produsere produkter som er vanskelig å kopiere i konkurrentland (Dreyer, 2006). Undersøkelser har vist at ferskt råstoff av høy kvalitet gir flere produktopsjoner og en bedre pris i betalingsvillige markeder (Henriksen & Sogn-Grundvåg, 2011; Henriksen & Svorken, 2011; Heide & Henriksen, 2013). Gjennom en gunstig geografisk lokalisering nært rike fiskefelt vil en ferskfiskstrategi kunne differensiere seg fra frossenfisk. For bedriftene i populasjonen vil derfor lokalisering, fangstmåte, lagring og behandling av fisken være viktig. I følge Heide & Henriksen (2013) er krokfanget fisk mer egnet til produksjon av filet enn fisk fanget i store hal med snurrevad og trål. Det er en utfordring for landanleggene å kunne kjøpe råstoff fra kystflåten. Vær og vind kan gjøre det vanskelig for denne flåtegruppen å sikre kontinuerlige leveranser. Hermansen *et al.* (2012) fant at kystflåten hadde en langt større variasjon i torskelandinger over året enn trålerflåten.

Også forbrukermarkedet for filetprodukter er i endring. Tinte filetprodukter har seilt opp som en konkurrent til genuint fersk filet. I følge Egeness *et al.* (2010) kan konsumenter i Storbritannia finne tinte filetprodukter i selvbetjente kjøledisker basert på frosset hvitfisk. Forretninger som selger fisk, ønsker en jevn forutsigbar vareflyt gjennom hele året. Tinte fiskeprodukter kan imøtekomme dette behovet i større grad enn genuint ferske produkter. Dersom forbrukerne opplever at kvaliteten er god nok på tinte fileter, kan disse bli en alvorlig konkurrent og trussel for genuint fersk filet.

Eksterne trusler – institusjonelle rammer begrenser handlingsrommet

Også institusjonelle forhold påvirker bedriftenes muligheter til å skape gode økonomiske resultater. Industrien bærer preg av et rigid institusjonelt rammeverk som reduserer bedriftenes strategiske handlingsrom. Deltakerloven er sentral fordi den begrenser hvem som har tillatelse til å eie fiskefartøy. Hovedregelen er at eier skal være aktiv fisker. En fiskeindustribedrift kan altså i utgangspunktet ikke eie et fartøy selv.

Men det har blitt gitt dispensasjoner fra eierskapsbegrensingene. Noen fiskeindustrianlegg har fått tillatelse til å eie og drive trålere for å sikre en jevn og stabil råvaretilgang (Svorken *et al.*, 2006; Holm *et al.*, 2013). Slike trålere er imidlertid pålagt leveringsplikt. Dette innebærer at det stilles krav til hvor fisken skal leveres, hvordan prisen skal bestemmes og hvordan fisken skal bearbeides.

I strategilitteraturen blir ofte vertikal integrering sett på som et virkemiddel for å redusere usikkerhet knyttet til råvarekvalitet og tilgjengelig volum (Isaksen, 2007). Flere studier viser imidlertid at leveringsplikt i liten grad påvirker bedriftenes lønnsomhet (Flaaten & Heen, 2004; Dreyer *et al.*, 2006; Isaksen, 2007; Hermansen *et al.*, 2012).

Prisen på råvarer avspeiler ofte usikkerhet på tilbudssiden. Gjennom Råfiskloven er fiskerne sikret en minstepris ved salg på første hånd ved at all omsetning av fangster gjøres gjennom salgslag eid av fiskerne, altså leverandørene. Intensjonen er å stabilisere prisene og sikre at fiskerne får sin «rettferdige» andel av fangstverdien.

Vår gjennomgang av den empiriske konteksten illustrerer noen av truslene som bedriftene i norsk filetindustri står ovenfor. Den største usikkerheten kan spores til tilgangen på råstoff hvor variasjon i volum og kvalitet over året er sentral. Men gjennom bruk av ulike fangstredskaper, lokalisering, leveringsplikt, behandling og lagring gir usikkerhet rundt råvaretilgangen rom for strategiske tilpasninger. I neste hovedavsnitt vil vi beskrive datasettet og presentere arbeidshypoteser som kan forklare sentrale egenskaper for økt lønnsomhet.

Prestasjonsmåling

I tråd med vårt teoretiske perspektiv vil vi forsøke å forklare prestasjonsforskjeller med at bedriftene besitter egenskaper (sterke/svake sider) som i ulik grad er i

stand til å takle muligheter og trusler på konkurransearenaen (Bharadwaj *et al.*, 1993). Den største usikkerheten i omgivelsene er tilgangen på råstoff – det vil si volum, arter og kvalitet (Ottesen & Grønhaug, 2003; Dreyer & Grønhaug, 2004; Isaksen, 2007). I denne studien har vi derfor valgt å vektlegge koblingen mellom prestasjoner og råstoffusikkerhet.

Vi har benyttet *Driftsundersøkelsene i fiskeindustrien* (heretter kalt DU) for å finne et tallmateriale som gir presise data om lønnsomhet på bedriftsnivå og dessuten produksjonsstatistikk. DU er en årlig undersøkelse som er gjennomført siden 1977 der produksjons- og regnskapsstatistikk er innhentet på bedriftsnivå. Undersøkelsen er basert på regnskap for samtlige bedrifter i Norge som produserer ulike former for sjømat. I DU blir bedriftene delt opp i underpopulasjoner avhengig av produktporteføljer og hvilke fiskearter som er sentrale råvarekilder. I vår studie har vi rettet oppmerksomheten mot de bedriftene som i hovedsak produserer filetprodukter med utgangspunkt i ville hvitfiskarter (Bendiksen, 2013). I analyseperioden (2002–2011) har den totale populasjonen gått fra 15 bedrifter til seks. 26 ulike bedrifter har vært med i populasjonen. Hver av dem har minst ett registrert driftsår. Utviklingen i industristrukturen er preget av at bedrifter forsvinner fra populasjonen, blir kjøpt opp eller har produksjonsstans i deler av analyseperioden.

Tidsrommet vi har valgt illustrerer godt den strukturelle turbulensen som filetindustrien har vært i og fortsatt er i. Det er særlig interessant å studere varige konkurransefortrinn i slike populasjoner fordi seleksjonsprosessene går hurtig, og de økonomiske effektene av strategiske valg blir raskt synlige. Mulighetene til å avdekke hvilke strategivalg som kan forklare variasjon og prestasjoner i bedriftene er bedre i en slik setting. Mange studier av varige konkurransefortrinn blir kritisert for at de ikke kontrollerer på en overbevisende måte om suksesskriteriene som avdekkes også var til stede blant bedriftene som falt fra (Bendiksen *et al.*, 2005). Dette er en viktig kritikk fordi studier som retter oppmerksomheten mot *hvorfor* bedrifter oppnår varige konkurransefortrinn, bør velge et design og et tallmateriale som gjør det mulig å måle strategiske valg og prestasjoner over tid i hele populasjonen – også blant de bedriftene som presterer dårlig og faller fra.

Designet som er valgt, fokuserer på om enkelte bedrifter i populasjonen har konkurransefortrinn. Deretter sammenligner vi disse bedriftene med resten av populasjonen for å kunne forklare eventuelle forskjeller. En bedrift med konkurransefortrinn vil være mer lønnsom enn en bedrift uten slike fortrinn. Prestasjonsmålet vi bruker, totalrentabilitet, omfatter den samlede aktiviteten i bedriften og gjør det mulig å sammenligne bedrifter av ulik størrelse (Isaksen, 2007).

Tidsaspektet avgjør om et fortrinn er varig eller ikke. Denne studien strekker seg over en periode på 10 år (2002–2011). Vi forutsetter dermed at varige konkurransefortrinn kan spores ved at enkelte bedrifter har oppnådd høyere totalrentabilitet enn andre i denne perioden.

Med utgangspunkt i totalrentabiliteten har vi konstruert et relativt lønnsomhetsmål som tar høyde for bedriftenes prestasjoner over tid (Dreyer, 1999). Alle filetbedriftene er blitt tildelt en verdi fra 1 til 4 avhengig av hvilket lønnsomhetskvartil de har vært i hvert enkelt år i analyseperioden. Verdien 4 viser at bedriften det spesifikke året er i kvartilet med høyest totalrentabilitet, mens verdi 1 tilsvarer kvartilet med dårligst rentabilitet. Deretter har vi beregnet gjennomsnittet for hver enkelt bedrift for samtlige år. Slik blir det mulig å sammenligne bedriftenes relative lønnsomhet i populasjonen. Vi definerer bedrifter som over tid har et lønnsomhetsmål nær eller lik 4 til å ha varige konkurransefortrinn.

Prestasjonsgrupper

I populasjonen oppnådde tre bedrifter et relativt lønnsomhetsmål nær eller lik 4. Det innebærer at de var blant de mest lønn-

somme filetbedriftene nesten hvert år i hele analyseperioden. I motsatt ende av skalaen var det 10 bedrifter som hadde et relativt lønnsomhetsmål nær eller lik 1. Resten av bedriftene (13) havnet i kvartilene 2 og 3. I Tabell 1 under har vi slått disse sammen til én kategori og gitt den navnet Middels. En Single Factor Anova-test viste en signifikant forskjell mellom gruppegjennomsnittene ($p < .000$).

I studien har vi nå etablert et empirisk grunnlag for å gjøre en systematisk analyse av hvilke egenskaper (interne sterke/svake sider og muligheter/trusler i omgivelsene) som kan forklare prestasjonsforskjellene i populasjonen. I fortsettelsen skal vi utvikle arbeidshypoteser i et forsøk på å forklare variasjonen i lønnsomhet.

Arbeidshypoteser

I dette hovedavsnittet vil vi presentere arbeidshypoteser knyttet til forskningsspørsmålet vårt: Har de beste bedriftene sterke sider som bidrar til at de i større grad klarer å utnytte muligheter og unngå trusler i usikre omgivelser? I drøftelsene vil vi forsøke å koble hypotesene til studiens teoretiske rammeverk slik dette er illustrert i Figur 1.

Gir tilgang på høy råstoffkvalitet en mulighet som kan utnyttes?

I følge Sogn-Grundvåg *et al.* (2008) er norske filetbedrifters fremste konkurransefortrinn forvitret som følge av at det har blitt etablert et globalt marked for fryst råstoff. Bedriftene vil derfor tape konkurransen mot internasjonale aktører med lave arbeidskraftkostnader dersom de bare baserer produksjonen på fryst filet (Dreyer, 2000; Bendiksen & Dreyer, 2002). For norske filetbedrifter blir det da viktig å differensiere seg i markedet. Ferskt råstoff er en produksjonsform som er vanskelig å kopiere for internasjonale aktører. Forskning viser at det fins betalingsvillige markeder for ferske fiskeprodukter (Lorentzen *et al.*, 2006). Gjennom sin lokalisering nært fiskefelt har norske bedrifter tilgang til slikt råstoff. En ferskfiskstrategi kan derfor være en kilde til konkurransefortrinn for bedrifter som klarer å håndtere utfordringene knyttet til kontinuitet i leveranser og råvarekvalitet (ibid.)

Bedrifter med fokus på råvarekvalitet vil kunne oppnå en høyere salgspris hos kundene (Heide & Henriksen, 2013). Produktutbyttet er svært sentralt. Gjennom høyt produktutbytte øker salgsvolumet (Karlsen *et al.*, 2013). Samtidig vil en større andel av fileten kunne anvendes til de best betalte produktene (ibid). Fersk filet er imidlertid sårbar for antall dager de kan ligge i butikkhyllene før de må konsumeres (Heide & Henriksen, 2013). Produkter av høy råvarekvalitet har et potensiale for lengre hylletid enn råvarer med dårlig kvalitet. Råvarekvaliteten kan også påvirke arbeidskraftkostnadene (ibid.). Et råstoff med få feil og høy ferskhetsgrad, gir lavere lønnskostnader. Høy råvarekvalitet vil altså bidra både til økte salgsinntekter og til reduserte produksjonskostnader.

Tabell 1 Relativ lønnsomhetsindikator og gjennomsnittlig råstoffvolum (alle arter) for prestasjonsgruppene

	Best		Middels		Dårlig	
Antall	3		13		10	
Driftsår	9,3		5,5		2,3	
	Snitt	Stdav	Snitt	Stdav	Snitt	Stdav
Relativ lønnsomhet*	3,73	0,319	2,43	0,456	1,08	0,15
Volum råstoff (tonn)	7 367	3 483	7 232	3 801	5 137	6 975

*ANOVA Single Factor viste signifikante forskjeller mellom gruppene, $p < .000$

En viktig driver for råstoffkvalitet er hvilket redskap som er benyttet til å fange fisken. Flere studier indikerer at fisk fanget med krokredskaper har få fangstskader og gir best kvalitet (Akse *et al.*, 2013). Slike redskap er spesifikke med tanke på fiskestørrelse. Dette er viktig siden størrelse bestemmer anvendelsesområdet (Lorentzen *et al.*, 2006; Akse *et al.*, 2013). For filetindustrien er liten og mellomstor fisk det optimale siden filetmaskiner ikke klarer å håndtere for stor fisk (Svorken & Dreyer, 2007).

Vi forventer at bedriftene som gjør det best utnytter muligheten som ligger i geografisk nærhet til rike fiskefelt og at de i stor grad baserer produksjonen sin på ferskt råstoff. En råstoffstrategi basert på fersk fisk kan gi grunnlag for produktdifferensiering. Videre tror vi de beste bedriftene fokuserer på leveranser fra redskap som gir råstoff av høy kvalitet. Vi har målt kvalitet langs to dimensjoner. Først måler vi andelen av ferske leveranser i forhold til totale årlige leveranser. Deretter måler vi andel årlige leveranser fra krokredskap. Vi forventer derfor at:

Hypotese 1

H1a: De beste filetbedriftene har en større andel ferske leveranser enn de øvrige.
H1b: De beste filetbedriftene har en større andel leveranser fra krokredskap enn de øvrige.

Er en høy råstoffpris en trussel som kan unngås?

Et annet sentralt element for å oppnå god lønnsomhet er prisen på viktige innsatsfaktorer. Råfiskloven demper prissvingningene, men for bedriftene vil råstoffpris være svært avgjørende ettersom råstoffkostnadene utgjør mellom 60 og 85 % av totalkostnadene (Bendiksen, 2013). Prisen på innsatsfaktoren har derfor stor innvirkning på bedriftenes økonomiske resultat. Det er derfor viktig at bedriftene fokuserer på å minimere råstoffkostnadene. Råstoffkostnadsvariabelen er operasjonalisert ved å beregne gjennomsnittet av årlig råstoffkostnad per art (torsk, hyse og sei) over årlig kvantum per art. I den sammenhengen antar vi at:

Hypotese 2

De beste filetbedriftene betaler mindre for råstoffet på første hånd enn de øvrige. Er lav kapasitetsutnyttelse en svakhet som kan reduseres?

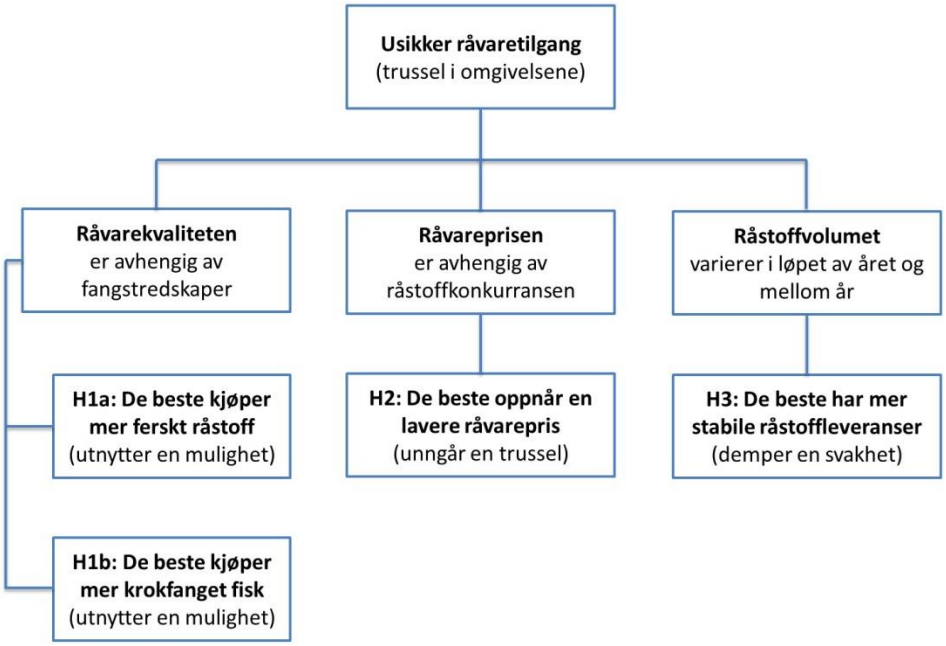
Et av de viktigste fortrinnene til norsk filetnæring er den unike tilgangen til fisk (Sogn-Grundvåg *et al.*, 2008). Allikevel har man sett at en av de største utfordringene for filetbedriftene er variasjon i volum over året (Lorentzen *et al.*, 2006). Tidligere undersøkelser har dokumentert at kapasitetskostnadene hos filetbedriftene utgjør en større andel av kostnadene sammenlignet med øvrig norsk næringsmiddelindustri (Dreyer, 1992; Bendiksen, 2013). Dette gjør filetbedriftene særlig utsatt for svingninger i råstofftilgangen. For aktørene i næringen vil det derfor være viktig å fremskaffe nok og egnet råstoff for produksjon hele året. Bedrifter som klarer dette uten at det går på bekostning av andre forhold, for eksempel pris og kvalitet, vil kunne oppnå bedre økonomiske resultater.

Vi har målt variasjonen i råstofftilførselen ved å beregne gjennomsnittet av månedlig standardavvik i analyseperioden. På grunn av ferieavvikling er ikke juli måned tatt med. Et stort standardavvik indikerer da en ujevn råvaretilgang, mens et lite tilsier stabile leveranser over året. Vi vil derfor fremme følgende hypotese:

Hypotese 3

De beste filetbedriftene har mer stabile leveranser av råstoff gjennom året enn de øvrige.

Figur 3 oppsummerer arbeidshypotesene og hvilke forventninger vi har til de filetbedriftene som presterer best.



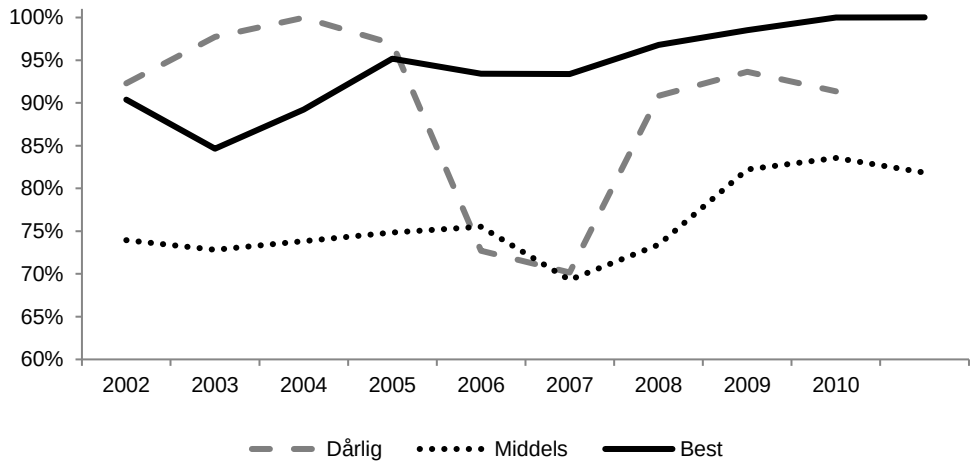
Figur 3 Oppsummering av den empiriske analysemodellen med forventede resultater for de beste bedriftene i populasjonen

Resultater

Vi har tidligere beskrevet hvordan vi har målt prestasjoner og hvordan disse målingene har gitt grunnlag for å etablere tre prestasjonsgrupper av filetbedrifter (Tabell 1). Nå er vi opptatt av å måle likheter og forskjeller i leveransemønsteret mellom prestasjonsgruppene for å kunne avkrefte eller bekrefte hypotesene vi har utviklet. I denne delen vil vi presentere empiriske funn i samme rekkefølge som i analysemodellen (Figur 3).

Hypotese 1a: De beste filetbedriftene har en større andel ferske leveranser enn de øvrige

I følge Hypotese 1a forventer vi at ferskt råstoff er en viktig verdidriver for filetbedriftene. Figur 4 illustrerer andelen ferske leveranser i de tre prestasjonsgruppene.



Figur 4 Gjennomsnittlig andel ferske leveranser hos prestasjonsgruppene i perioden 2002–2011 (Kilde: Fiskeridirektoratet og Driftsundersøkelsen), ANOVA Single Factor viste signifikante forskjeller mellom gruppene, p <.000

Figuren viser at de beste filetbedriftene mottok en andel ferskt råstoff som ligger mellom 85 til 100 %. For gruppen Middels ligger gjennomsnittsandelen ferskt råstoff mellom 69 til 84 %. For gruppen Dårlig er det store variasjoner fra år til år, men bortsett fra driftsåret 2005 er andelen ferske leveranser lavere enn i den beste gruppen. Vi ser også av Figur 4 at andelen ferske leveranser er økende for gruppen Best utover i perioden. Basert på resultatene i Figur 4 er det ikke urimelig å svare bekreftende på Hypotese 1a. De beste filetbedriftene har en større andel ferske leveranser enn de øvrige bedriftene.

Hypotese 1b: De beste filetbedriftene har en større andel leveranser fra krokredskap enn de øvrige

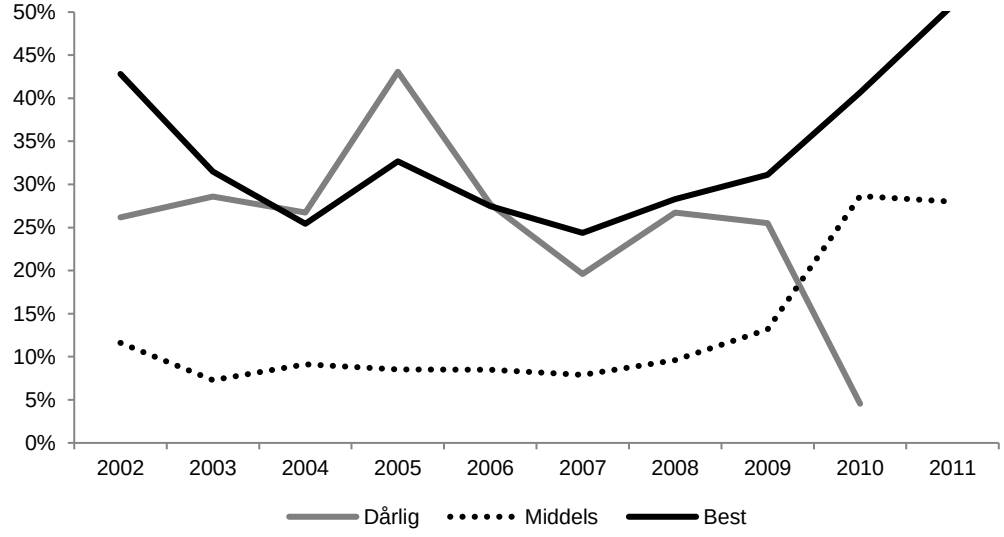
Siden kvalitet på råstoffet er viktig for lønnsomheten i filetproduksjonen, forventer vi at de mest lønnsomme filetbedriftene har lyktes med å skaffe seg det beste råstoffet.

Figur 5 viser at gruppen Best fokuserer på kvalitetsråstoff. Andelen av leveranser fra krokredskap har dessuten økt i løpet av perioden. I 2011 utgjør denne andelen circa 50 % av alle leveranser i den beste prestasjonsgruppen. For gruppen Middels ser vi den samme tendensen som hos den beste gruppen, men med en betydelig lavere andel krokfanget råstoff. For gruppen Dårlig observerer vi en motsatt utvikling der andelen krokfanget fisk avtar i perioden. Variasjonen i denne gruppen er midlertid påvirket av stor inn- og utgang av bedrifter fra år til år.

Basert på resultatene i Figur 5 finner vi det rimelig å bekrefte Hypotese 1b. De beste filetbedriftene har en større andel leveranser fra krokredskap enn de andre bedriftene.

Hypotese 2: De beste filetbedriftene betaler mindre for råstoffet på første hånd enn de øvrige

Råstoffkostnader utgjør den største kostnadsposten for bedriftene i filetindustrien (Bendiksen, 2013). Råstoffpris vil derfor ha stor betydning for bedriftenes økonomiske prestasjoner. Tabell 2 viser gjennomsnittlig råstoffpris på de viktigste artene for prestasjonsgruppene.



Figur 5 Gjennomsnittlig andel årlige landinger fra line og andre krokredskaper. Kilde: Fiskeridirektoratet og Driftsundersøkelsen. ANOVA Single Factor viste signifikante forskjeller mellom gruppene, p <.000

Tabell 2 Gjennomsnittlig råstoffpris for torsk, hyse og sei for de tre prestasjonsgruppene i perioden 2002–2011

	Best	Middels	Dårligst	
	Snitt	*Snitt*	*Snitt*	*p-verdier**
Torsk	12,16	12,88	12,44	0,81
Hyse	7,28	7,94	7,65	0,62
Sei	4,32	4,10	4,04	0,71

*ANOVA Single Factor viste ingen signifikante forskjeller mellom prestasjonsgruppene for noen av råstoffartene

Tabell 3 Landingsmønsteret til de tre prestasjonsgruppene i perioden 2002–2011

	Sesongvariasjon, standardavvik (uten juli)			
	Best	Middels	Dårligst	*p-verdier**
Bare torsk	6,6 %	7,5 %	6,9 %	0,83
Torsk, hyse og sei	4,8 %	5,2 %	5,7 %	0,66

*ANOVA Single Factor viste ingen signifikante forskjeller mellom Prestasjonsgruppene for noen av råstoffartene

Tabell 2 viser at de beste filetbedriftene i gjennomsnitt betaler mindre per kilo råstoff for artene torsk og hyse enn bedriftene i de to andre prestasjonsgruppene. Prisdifferansene mellom gruppene varierer fra et par øre og opp til 44 øre. For arten sei, var ikke resultatet det samme som for torsk og hyse. Her ble den laveste råstoffprisen observert hos gruppen Middels. Dette kan skyldes at to aktører i denne gruppen mottar notfanget sei av mindre størrelse og som er lavere priset enn sei landet med øvrige redskap. Variasjonen i råstoffprisen er relativt liten mellom gruppene, og en Anova Single Factor-test viste at forskjellene ikke var signifikante.

De beste bedriftene betaler mindre per kilo råstoff for artene torsk og hyse, men ikke for sei. Hypotese 2 om at de beste filetbedriftene betaler mindre for råstoffet på første hånd enn øvrige bedrifter, blir altså ikke bekreftet i våre analyser.

Hypotese 3: De beste bedriftene har mer stabile leveranser av råstoff gjennom året enn de øvrige

Jevn råstofftilførsel er en forutsetning for å kunne oppnå god kapasitetsutnyttelse og lønnsom produksjon for en filetbedrift. Tabell 3 viser landingsmønsteret til de tre prestasjonsgruppene.

Tabell 3 viser at alle gruppene har en råstofftilgang som er basert på et sesongbasert fiskeri. Bedriftene i Best-gruppen har imidlertid minst sesongvariasjon med et standardavvik på 4,8 % for artene torsk, hyse og sei samlet. Standardavviket for gruppen Middels er på 5,2 %, mens det er 5,7 % for Dårlig-gruppen. En Anova Single Factor-test viste imidlertid at forskjellene mellom gruppene ikke er signifikante.

Alle prestasjonsgruppene demper sesongsvingningene for torsk noe ved å dreie produksjonen mot andre arter (hyse og sei). Resultatene i Tabell 3 viser imidlertid bare marginale forskjeller mellom prestasjonsgruppene. Det er derfor rimelig å avkrefte Hypotese 3 om at de beste filetbedriftene har mer stabile leveranser av råstoff gjennom året enn de øvrige bedriftene.

Diskusjon

Artikkelen er drevet frem av et spørsmål som har vært viet mye oppmerksomhet innen strategifaget – hvorfor oppstår varige

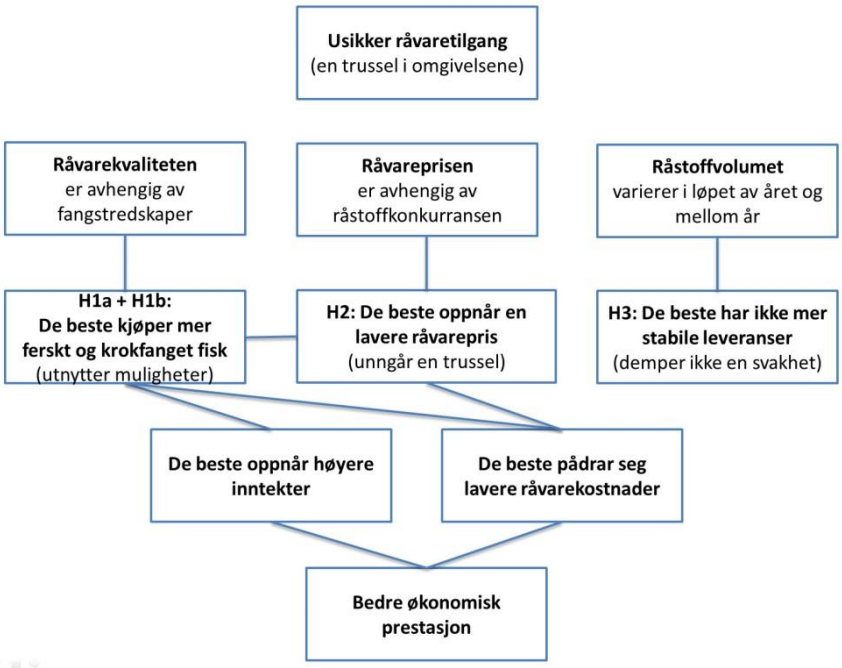
lønnsomhetsforskjeller mellom bedrifter som har samme type produksjon? I vår tilnærming har vi vært opptatt av å studere dette fenomenet i en bransje som over tid har slitt økonomisk. Gjennom å studere konkurransearenaen har vi rettet oppmerksomheten mot en populasjon av bedrifter som henter sitt råstoff fra en vill ressurs som det er knyttet stor usikkerhet til. For det første er det variasjoner i råvarekvaliteten. For det andre kan råvareprisen som bedriftene betaler variere, og for det tredje er det usikkert hvor store kvanta som er tilgjengelig til enhver tid.

Vår utgangshypotese har vært at dersom noen bedrifter oppnår varige konkurransefortrinn må de ha klart å handtere både kvalitets-, pris- og volumsvingningene på en bedre måte enn andre filetbedrifter. Designet vi valgte krevde en totrinns tilnærming til å studere fenomenet prestasjonsforskjeller. I trinn 1 målte vi bedriftenes relative prestasjoner over tid. Vi fant at en liten gruppe bedrifter oppnådde bedre økonomiske resultater enn de øvrige til tross for at de opererer i tilnærmet like omgivelser som er preget av stor turbulens. Disse resultatene samsvarer med funn fra andre studier som er gjort i samme industri (Dreyer, 1999; Dreyer & Grønhaug, 2004).

I det neste trinnet av analysen ble oppmerksomheten rettet mot hvilke *egenskaper (sterke og svake sider)* som var sentrale for å forklare prestasjonsforskjellene. Her sammenlignet vi gruppene langs tre dimensjoner relatert til råstoffusikkerhet – råvarekvalitet, råvarepris og råvarevolum.

De beste klarer å utnytte muligheter og unngå trusler

Et viktig funn var at de beste bedriftene har valgt en råvarestrategi som baserer seg på en stor andel ferskt råstoff levert fra krokredskap som juksa og line. Disse bedriftene klarer å utnytte muligheten som ligger i geografisk nærhet til rike fiskefelt. Samtidig unngår de å bli rammet av trusselen om råstoffkonkurranse fra internasjonale aktører som kjøper frosset råstoff. Dessuten reduserer de trusselen som ligger i råstoffkonkurransen fra konvensjonelle bedrifter ved å kjøpe liten og mellomstor fersk fisk.



Figur 6 Analysemodell og empiriske funn knyttet til verdifulle egenskaper hos de beste bedriftene

Svakheten som ligger i lav kapasitetsutnyttelse rammer alle bedriftene

Et annet forhold vi studerte var i hvilken grad bedriftene evnet å stabilisere råvaretilførselen gjennom året, og slik oppnå god kapasitetsutnyttelse i produksjonen og dermed bedre lønnsomhet. Her fant vi bare marginale forskjeller mellom de tre prestasjonsgruppene. Det viste seg at alle prestasjonsgruppene fikk til å dempe volumsvingningene for hovedarten torsk ved å skifte mellom ulike arter gjennom året. Slik har bedriftene delvis klart å håndtere variasjon i tilgjengelighet og oppnådd bedre kontinuitet i produksjonen. Men vi vil presisere at forskjellene mellom gruppene var små. Resultatene antyder at de beste bedriftene bevisst styrer unna det dyreste råstoffet. Dette får de til ved å rette oppmerksomheten mot liten og mellomstor fersk fisk.

I Figur 6 oppsummerer vi de empiriske funnene i tilknytning til vår analysemodell om hvilke egenskaper som kjennetegner de mest lønnsomme bedriftene.

Gjennom sine strategiske valg har den beste prestasjonsgruppen vist at de har kunnskap om truslene og mulighetene på konkurransearenaen. Dette er i tråd med Porters (1980) omgivelsesteori. Ved å observere endringene på råstoffmarkedet har de evnet å dreie fokuset mot ferske leveranser fra krokredskap og slik fått til å utnytte lokaliseringsfortrinnet som nærhet til slikt råstoff gir. For bedriftene i en næring preget av hard konkurranse kan dette være avgjørende for lønnsom drift og overlevelse.

Likevel kan det være utfordrende å dreie produksjonen mot ferske leveranser. Lorentzen *et al.* (2006) nevner to forhold: jevn tilgang på råstoff av høy ferskhetsgrad og kvalitet. I analysen er det observert at enkelte bedrifter som har dreid produksjonen mot ferskt råstoff har forsvunnet fra populasjonen, mens bedrifter som har en økt andel frosset råstoff har overlevd. Valgene som tas må derfor tuftes på hvilke ressurser hver enkelt bedrift har tilgjengelig, samt hvordan den enkelte leder oppfatter og responderer på endringer i omgivelsene. Det å kopiere de beste bedriftenes ferskfiskstrategi er derfor ikke tilstrekkelig for å oppnå lønnsomhet.

Implikasjoner

Vi håper at funnene våre kan gi næringsaktører økt kunnskap om hvordan de kan oppnå bedre lønnsomhet i filetsektoren. Resultatene kan kanskje også bidra som innspill til beslutningsprosesser i forvaltningen med sikte på å bedre filetbedriftenes rammebetingelser.

Ser vi på de næringsmessige implikasjonene av funnene, er de i tråd med forventningene. I så måte gir ikke studien mange overraskelser. Undersøkelsen er imidlertid en systematisk og grundig empirisk dokumentasjon av mulige forklaringer på lønnsomhetsforskjeller i filetindustrien helt siden Driftsundersøkelsen ble gjennomført for første gang for snart 40 år siden.

Ved å rette oppmerksomheten mot ferskt råstoff kan filetbedriftene øke sin lønnsomhet. En slik råstoffstrategi er imidlertid ikke lett å gjennomføre. Mesteparten av ferske landinger kommer fra kystfartøy med krokredskaper – en flåtegruppe som er blitt redusert de siste årene (Henriksen og Svorken, 2011). Dette har sammenheng med at lønnsomheten i dette flåteleddet er langt bedre når andre redskapstyper anvendes og sesongfisket intensiveres. Det stiller blant annet de mest vellykkede filetbedrifter overfor et dilemma: hvordan stoppe flukten fra krokredskaper uten å måtte heve råvareprisen slik at de mister den knappe marginen de har i dag?

Filetbedriftene har alltid hatt stor politisk legitimitet i Norge (Finstad *et al.*, 2012). Produksjonen er arbeidsintensiv og lokalisert nært fiskefelt med få alternative arbeidsplasser, særlig for kvinner. Den sterke legitimiteten har gitt grunnlag for å utforme særlige virkemidler ikke bare for å kunne øke lønnsomheten i filetproduksjonen, men

også for å skape sysselsetting og bidra til bosetting (Henriksen, 2013). Utviklingen i filetindustrien viser at dette ikke har vært en suksess. Nedgangen i antall bedrifter-, sysselsetting- og lønnsomhet viser en industri i hardt vær.

Et sentralt virkemiddel har vært å bruke torsketrålere til å redusere den usikre råvaretilgangen. Dette er gjort mulig ved at landanleggene har fått dispensasjon fra Deltakerloven til å eie trålere. I senere år er dette forsterket ved å pålegge trålerne både leveringsplikt og bearbeidingsplikt. Våre funn viser imidlertid at filetbedriftene som presterer best, i mindre grad mottar råstoff fra slike fartøy enn de øvrige.

Det kan derfor reises spørsmål om effekten av dette virkemidlet. Er de beste filetbedriftene blitt best på tross av at de ikke er begunstiget, eller på grunn av mangelen på et tilsynelatende feilslått virkemiddel? Bruk av torsketrålere og leveringsplikt kan ha gått ut på dato både av teknologiske og markedsmessige grunner.

Kanskje bør oppmerksomheten heller rettes mot hvordan det er mulig å skaffe fersk fisk med høy kvalitet til anleggene jevnt over året. Ferske leveranser fra tråldrift har ikke god nok kvalitet til å hjelpe filetbredriftene. Dessuten tvinger økonomiske drivkrefter trålerne over i et konsept med ombordfrysing. Torsketrål og produksjon av fersk filet ser altså ut til å være to produksjonskonsepter som har vokst fra hverandre.

Våre funn viser altså at råvarestrategien som har gitt best økonomiske prestasjoner de siste årene er satsing på fisk av god og forutsigbar kvalitet, det vil si liten og mellomstor krokfanget fisk. Biologisk skaper fiskens vandringsmønster et sesongbasert uttak. For bedriftene blir det avgjørende å utvikle verdifulle egenskaper som kan sette dem i stand til å møte denne utfordringen. Dette kan skje på flere måter. Kostnadene kan for eksempel reduseres i perioder av året når aktiviteten er lav. Men dette betinger lave oppstartskostnader når aktiviteten tiltar slik at vinningen ikke går opp i spinningen. Videre kan aktiviteten styres basert på hvilke råvarer som til en hver tid er tilgjengelig.

Ny teknologi kan bidra til å gjøre bedriftene mindre sårbare for sesongsvingninger i råvaretilgangen. En strategi kan være å fange, transportere og lagre fisken levende. Dette kan åpne for å redusere usikkerheten knyttet til kvalitet og volum, og bidra til å forsyne markedene kontinuerlig. Et slikt råstoff er også godt egnet til andre produktvarianter, og det vil være tilgjengelig for filetbedrifter nært kundene i mange viktige eksportland.

Selv om teknologiske innovasjoner kan redusere lønnskostnadene, stabilisere råvaretilgangen og heve råstoffkvaliteten, kan den imidlertid ikke fjerne det som alltid har vært hovedutfordringen – bedriftene må prestere økonomisk for å kunne konkurrere både lokalt og globalt om det beste råstoffet. Mye tyder altså på at egenskaper hos filetbedriftens råvareleverandører også i fremtiden vil være en viktig kilde til konkurransefortrinn.

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Juks og fanteri i fiskeri

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Sammendrag på norsk:
Vinteren 2013 gikk det mange rykter om «storhundra», det vil si at det ble landet mer torsk enn det som ble registrert. Noe overraskende kom disse ryktene i et år med rekordhøye kvoter. Rykteflommen var også sterk tidlig på 1990-tallet og ved årtusenskiftet, men da i perioder med historisk lave kvoter. Med utgangspunkt i disse observasjonene skal vi her diskutere de underliggende økonomiske motivene for juks og hvordan det jukses. Artikkelen har ikke ambisjon om å måle hvor mye fangst som ikke registreres. Heller er ambisjonen å forstå – ved hjelp av enkle økonomiske modeller – hvorfor motivene for uredelighet er særlig sterke både i perioder med høye og lave torskekvoter.

Abstract in English:
During the winter of 2013 rumors on unregistered landings of cod occurred in Norwegian media. This was surprising as the cod quotas was at a historical high level. Same kind of rumors were present in the early 90-ties when the cod quotas were at the lowest levels ever. Based on these observations we apply economic models and discuss why actors may be motivated for unregistered landings in periods where the quotas are at high and low levels.

Fiskekvoter definerer juks

De norske torskekvotene økte fra 340 tusen tonn i 2012 til nesten 455 tusen tonn i 2013. Det er derfor overraskende for mange at ryktene om juks var så fremtredende i 2013.

Også i perioder med lave kvoter har ryktene om juks vært mange. Torskekvotene var rekordlave, 113 tusen tonn, i 1990. Samtidig ble det ikke lenger tillatt å fiske mer enn kvotene – heller ikke i fartøygrupper som tidligere hadde fått fiske langt mer enn tildelte kvoter. Rundt årtusenskiftet falt kvotene igjen dramatisk – fra nesten 400 tusen tonn (1997) til 200 tusen tonn (2000). Ettersom kvotene ble oppfisket veldig tidlig på året, og tilgjengeligheten var svært god, var det ikke overraskende at noen aktører ble motiverte til å fiske mer enn sine tildelte kvoter.

Selv om kvotestørrelse ikke er den eneste faktoren som kan forklare juks, er den likevel viktig for å forstå motivene for juks. I torskefiskeriene begrenses en kvote av et *kvantum,* en *art* og en *tidsramme.* Både rykter og rettsaker har vist at uredeligheter når det gjelder registrering av kvantum (hele fangsten blir ikke seddelført), art (torsk blir registrert som en annen art) og tidsramme (tidspunkt for landing blir justert).

Etablering av fiskekvoter er en sterk inngripen i fiskernes frihet til å fiske ubegrenset, men nødvendig for å få på plass et bærekraftig fiskeri. På 1990-tallet var kvotene ofte bare knyttet til en definert fartøygruppe. I dag er kvoten i sterkere grad fordelt på det enkelte fartøy. Dette kan ikke skje uten et sterkt juridisk rammeverk som definerer at det er ulovlig å lande større kvanta enn kvotestørrelsen. Derfor er juks i fiskeriene nært knyttet til at det fiskes mer enn hva som er tildelt. Salgstrikset «3 for 2» blir problematisk i førstehåndsmarkedet fordi det bærer bud om ulovlig overfiske.

Rykte = Juks?

Å måle uredelighet, i form av at det landes mer fisk enn det som registreres, er vanskelig. Selv om vektene kontrolleres, er det ikke en nøytral part som veier og registrer fangsten. Det er mange små landinger, og det er bare en brøkdel av fangstene som blir kontrollert. En måte å måle uredelighet på kan være å registrere antall saker som fører til straffeforfølgelse og dom. Mange slike saker indikerer mye uredelighet og

omvendt. Svakheten med et slikt mål er imidlertid at antall kontroller påvirker antall saker som tas til retten og antall kontroller varierer – sannsynligvis i takt med ryktene om juks. I så måte er 2013 og 2014 illustrerende. Ryktene om juks var sterkest i 2013, og det førte til økt oppmerksomhet om problemet og at antall kontroller økte i 2014.

En annen svakhet med et slikt mål på uredelighet er at de som setter ut og sprer ryktene kan ha flere motiv for dette. Ett motiv kan være frustrasjon over pris og andre betingelser knyttet til transaksjonen. Det kan enten være knyttet til generelle forhold ved markedsarenaen eller den enkelte transaksjonen. Blant de som ikke jukser kan spredning av rykter selvsagt også være knyttet til frustrasjon over egen konkurranseevne som svekkes av de som jukser.

Selv om rykter ikke nødvendigvis er et presist mål på juks er det likevel det beste målet vi har. I denne artikkelen benyttes derfor omfanget av rykter som en indikasjon på juks. Det vi har gjort er å overvåke i hvor stor grad problemet med uregistrerte landinger diskuteres i fiskeripressen, og hvordan dette varierer over tid. Når rykteflommen er stor i løpet av en sesong, tas det som en indikasjon på at det jukses mer enn i sesonger med lite rykter.

I alle næringer vil det være enkelte aktører som er villig til å begå ulovligheter. Ingen ting tyder på at fiskeriene er et unntak i så måte. Også her ser vi at de fleste aktørene opptrer redelig. Det erkjennes at ulovligheter svekker omdømme og skaper en uheldig konkurransevridning i næringen. Flere forhold utfordrer imidlertid lovlydigheten i denne næringen. Det er knyttet stor usikkerhet til biologi og tilgjengelighet samtidig som store og brå endringer i kvotene fra år til år skaper stor usikkerhet knyttet til pris og markedsforhold. Dette kan i perioder skape sterke økonomiske motiver for å unnlate å registrere deler av fangsten både hos selger og kjøper.

Legitimitet

For at noe skal oppfattes som ulovlig, må lovverket ha legitimitet. Etablering av fiskekvoter ga en begrensing som først og fremst berørte dem som høstet fra bestanden. I torskefisket ble det anvendt et prinsipp for tildeling av kvotene som utelukket aktører som ikke kunne vise til historisk fiske. Forståelse av juks var svært avhengig av at ordningen ble oppfattet som nødvendig, og dermed legitim, blant de aktørene som fikk tildelt kvoter og de som ikke fikk slike.

Hovedbegrunnelsen for å innføre kvoter i fiskeriene er at det fanges mer fisk enn bestanden tåler (overfiske). For å redde bestanden, og levebrødet til de aktørene som har sitt virke i å fange og foredle fisken, grep myndighetene inn med fangstbegrensninger (kvoter) som skulle sørge for at det ikke ble fanget mer fisk enn bestanden tålte. I så måte er det ikke tilfeldig at et kvoteregime i torskesektoren først ble gjennomført i alle flåtegrupper fra 1989. Da var bestandsmålingen så urovekkende lav at aktørene var motiverte for strenge reguleringer som kunne bidra til å bygge opp torskebestanden. Det er ikke uvanlig at et kvoteregime først blir implementert når bestanden er truet av utryddelse. I et sånt perspektiv vil det forventes at kvoteregimets legitimitet synker når aktørene ikke opplever at bestanden er truet.

Manglende legitimitet kan derfor være en forklaring på juks. For eksempel i 1990, da kvoteregimet var nytt, var det en viss fare for manglende tillit til kvoteregimet og noen derfor fanget større mengder enn tillatt. Enten fordi de var uenige i behovet (liten tiltro til bestandsestimatene) og/eller uenige i fordelingsnøkkelen (historiske rettigheter). Vi har også sett at legitimitet er viktig for å forstå ulovlig fiske i internasjonale farvann (Smutthullfiske blant aktører uten kvoter).

I dag er omregningsfaktoren svært sentral i diskusjon om juks og legitimitet. Torskekvotene fordeles i rund vekt. Ettersom torsken leveres etter ulik grad av beskjæring, er det en utfordring å finne omregningsfaktorer som gir riktig avregning av torsk i rund vekt. Dette blir fort komplisert fordi omregningsfaktoren påvirkes av biologiske forhold som fiskestørrelse og fiskens kondisjon. Samtidig er produktutbytte avhengig av individuelle ferdigheter og teknologi. På 90-tallet var det store diskusjoner omkring det såkalte «melbukuttet», hvor det ble hevdet at den offisielle omregningsfaktoren premierte

sløsing med torskekvoten slik at kvoteavregningen ikke ble riktig i forhold til faktisk fangst. I det siste har oppmerksomheten særlig vært rettet mot omregningsfaktoren mellom rund og sløyd torsk. Ettersom stadig mer av kvantumet leveres usløyd, og at fisken veies både før og etter sløying, har det blitt avdekket at omregningsfaktoren som benyttes ikke er riktig for den delen av bestanden som det fiskes på under vinterfisket.

Fangstøkonomi og juks

Dårlig lønnsomhet kan påvirke tilbøyeligheten til å jukse. I et fiskeri er inntektene avhengig av fangstvolum og pris. I så måte griper kvoter rett inn i inntektene ved at fangstvolum begrenses. Likevel er fiskerne motiverte for kvotebegrensninger fordi det trygger bestanden, fremtidige kvoter og dermed fremtidige inntekter. Utfra et økonomisk perspektiv er det naturlig å tenke seg at motivene for å jukse (fange mer enn kvoten) øker når inntektsbortfallet blir stort. Det skjer ved betydelige kvote- og/eller prisfall.

Det er imidlertid også andre elementer ved fartøyøkonomien som påvirker tilbøyeligheten til å jukse. Fangstkostnadene vil sannsynligvis spille inn. Dersom kostnadene i fangst er store, vil motivene for «storhundre» (større mengde enn registrert) eller å gi bort forringet fisk svekkes. Høye kostnader ved å bringe ny fisk på land vil sannsynligvis innebære lavere tilbøyelighet for juks. Samtidig vil et slikt resonnement innebære at lave kostnader kan øke tilbøyeligheten for juks

En annen viktig dimensjon, i fartøyøkonomien, er fangstkapasitet. Et fartøy som har en kvote som ligger tett opp i mot dets fangstkapasitet, vil sannsynligvis være mindre motivert for å jukse med kvantum enn et fartøy som har mye ledig fangstkapasitet. Også fangstkostnadene er viktig i debatten om juks. Særlig er det påpekt at kombinasjonen fall i lønnsomhet og høy gjeldsbelastning kan være med å flytte grensene for høy moral.

Etterspørselsforholdene vil også spille inn. Hovedsakelig vil dette skje gjennom prisingen på første hånd. For eksempel vil lav kvote ofte føre til økte priser. Høy etterspørsel, lav legitimitet og stor ledig fangstkapasitet kan imidlertid også gi økonomiske motiver for å fiske ut over kvoten. På den måten kompenseres det for deler av inntektsbortfallet som den markante kvotereduksjonen normalt medfører. Dette kan bidra til å dempe tilbøyeligheten for juks ved at kvotereduksjonen blir kompensert med prisøkning. Dette var situasjonen rundt 1990. Økende kvoter vil ofte innebære prisfall. Dersom prisfallet er så dramatisk at det ikke kompenseres av kvoteøkningen, kan det motivere for juks. Dette ser ut til å ha vært situasjonen i 2013 hvor torskekvotene økte med 34 %, og prisstatistikken viser at førstehåndsprisen på torsk falt med 21 % i forhold til 2012.

Sannsynligvis er det også en annen viktig mekanisme som slår inn ved kvoteøkning – kjøpemotstand. Det var for eksempel ved inngangen til 2013 stor usikkerhet om hvilke markedsmessige og kvalitetsmessige konsekvenser den store kvoteøkningen ville få. I en slik situasjon kan prisforhandlinger oppstå på kaikanten. For eksempel kan fisk med kvalitetsfeil eller uønsket størrelse «gis» til kjøper mot at den ikke registreres og kvoteavregnes. Flere forhold tyder på denne formen for juks er mest aktuell når kvotene er høye, fangstkostnadene er lave som følge av god tilgjengelighet og en pågående heftig offentlig debatt om minsteprisnivået.

I perioden 2003 til 2008 var den offentlige oppmerksomheten rundt juks lav. Dette var en periode med høye og stigende råstoffpriser og middels store kvoter. Redusert flåtekapasitet sammenlignet med begynnelsen av 90-årene og gode råstoffpriser, kan ha gitt redusert motivasjonen for å jukse med kvantum.

Heleren

For at en handel skal kunne etableres basert på at det fanges mer enn kvoten, må flere ledd i verdikjeden enn fangstleddet være motivert for juks. I situasjoner hvor både selger og kjøper kan oppnå gevinst ved juks, vil sannsynligheten for juks øke. Det er derfor relevant å spørre hva som motiverer kjøpersiden til å bidra til at uregistrert fangst blir omsatt.

Også her er legitimitet viktig. I debatten som ble ført vinteren 2013, var det ikke først og fremst legitimiteten til kvoteregimet som ble nevnt, men legitimiteten til omsetningssystemet. To forhold fikk særlig stor oppmerksomhet; administrerte priser og mangelfull prising av kvalitet. I Norges Råfisklags distrikt fastsettes minsteprisen for hele distriktet, for hele flåten og for en prisperiode som varer i opptil 4 måneder. Målet er at prisen som fastsettes skal være riktig markedspris. Ryktene om juks blir gjerne forsterket i perioder med fallende markedspriser og god tilgjengelighet. Legitimiteten til minsteprisordningen vil være avgjørende for kjøpernes motivasjon for juks. En situasjon med høye kvoter vil ofte innebære prisfall i sluttmarkeder. Dersom ikke minsteprisene fullt ut reflekterer slike prisfall, vil forhandlingsmakten forskyves mot kjøpersiden og minsteprissystemet settes under press. Det kan bidra til å øke tilbøyeligheten for juks. I så måte blir juks en måte å justere pris på gjennom at det leveres større kvanta enn hva som oppgis på sluttseddelen. Legitimiteten for en slik praksis kan for eksempel kobles til kvaliteten på råstoffet. Fangstleddets «tap» blir mindre når det «svarte» volumet ikke blir kvoteavregnet og fangstkostnadene er lave. Fartøy med lave fangstkostnader og mye fisk av dårlig kvalitet, vil være mer utsatt og motivert for slike «forhandlinger», enn fartøy med høye fangstkostnader og fisk av høy kvalitet. Når bestanden er god, som reflekteres i høye kvoter, vil i tillegg legitimiteten til kvoteregimet være svekket (bekymringen for at bestanden skal kollapse er liten).

I en situasjon med lave kvoter, vil forhandlingsmakten være forskjøvet over mot fangstleddet (etterspørselsoverskudd). Ofte bidrar dette til et prisløft. Et slikt løft vil være med på å dempe motivasjonen for å jukse med kvantum. Nivået på minsteprisen vil få mindre oppmerksomhet, ettersom det oftest betales langt høyere priser for torsken.

Naturligvis kan også lønnsomheten være en viktig motivasjonsfaktor for at kjøper skal være med på å jukse med kvantum. Kjøperkorpset i torskesektoren har over tid hatt svak lønnsomhet. Dette viser de årlige regnskapstallene og det store frafallet av bedrifter. Råstoff er den dominerende kostnadskomponenten til disse fiskeprodusentene. De konkurrerer i et tøft internasjonalt matvaremarked hvor konkurrentene ofte har lavere arbeidskraftkostnader. I så måte kan juks med kvantum bidra til å styrke konkurransekraften i et tøft internasjonalt marked.

Ettersom juks er avhengig av to parter, er det nærliggende å tenke seg at tilliten mellom to aktører må være svært sterk, dersom juks skal være mulig. En måte å bygge slik tillit på er gjennom sosiale bindinger. En annen måte er å låse hverandre i et skjebnefellesskap, gjennom høy gevinst for begge parter (store volum) og store kostnader dersom avtalen blir offentlig kjent. Det er i denne sammenheng påfallende at en av de viktigste kanalene for omsetning, rundfrossen råstoff som lagres og selges fra et nøytralt fryselager, ser ut til å gå klar av ryktene om juks. Kanskje bidrar et nøytralt mellomledd, auksjonsbasert prising og åpningen for reklamasjoner til at mulighetene for juks med kvantum reduseres i omsetningen av ombordfrossen fisk.

Straff

Den viktigste barrieren mot å jukse er faren for å bli tatt og straffet. Dersom antall saker som ble ført for retten legges til grunn, er det lite som tyder på at det er hold i ryktene i 2013. Her må det imidlertid vektlegges at det ikke ble satt i verk ekstraordinære kontroller i 2013. Ved inngangen til 2014 var imidlertid oppmerksomheten blitt så sterk at kontrollene ble intensivert vinteren 2014. Denne tidsleggen mellom rykter og antall kontroller ser vi også i tidligere perioder med mye rykter om uredeligheter. Rundt 1990 ble ryktene fulgt opp med en rekke store aksjoner fra kontroll- og tiltalemyndigheter. Flere saker endte med domfellelse, men ofte ble de tiltalte dømt for langt mindre forseelser enn tiltalen. En viktig pådriver i dette arbeidet var Kontrollverket.

Motivene for juks, og måten det ble jukset på ved kvotefall, har en annen karakter enn når kvotene er høye. Ved lave kvoter er det periodisering av fangsten og omskriving av art som er triksene. Ofte ser vi at ryktene om juks reduseres når kvotenivået normaliseres. Sannsynligvis

er domfellelser svært viktig av allmennpreventive grunner. Men om det er dette, eller normalisering av torskekvotene som er årsaken, er vanskelig å vite sikkert. Både nivået på rykteflommen og antall rettssaker indikerer imidlertid at problemene med juks blir redusert når kvotenivået normaliseres.

I 2013 var situasjonen annerledes. Kontrollverket var historie. Kvotene var svært høye og metodene som ble brukt for å jukse endret karakter. Dersom rykteflommen avspeilet nivået på juks, er det flere forhold som indikerer at redselen for å bli tatt ikke var tilstrekkelig til å hindre aktørene fra juks. En sentral utfordring for å avsløre juks, er at omsetningen er svært kompleks. Det er mange små fangster som leveres på kort tid, over et stort geografisk område og til mange kjøpere.

En annen viktig dimensjon som demper tilbøyeligheten til å jukse, er faren for omdømmetap. Overfiske av tildelte kvoter blir overvåket av andre næringsaktører. Overfiske er en trussel mot fremtidige kvoter, som på sikt vil gå ut over alle som tildeles kvoter. Samtidig skal hele kjøperkorpset konkurrere om kunder. Dersom noen styrker sin konkurranseposisjon gjennom uredelighet, vil omdømmet bli svekket både i forhold til fangstleddet og innad i kjøperkorpset. Aktører fra både fangstleddet og kjøperkorpset som jukser vil dessuten stå i fare for tap av omdømme i sine lokalsamfunn.

Flere forhold tyder på at uregelmessighetene i 2013 besto i at fisk med dårlig kvalitet ble gitt til kjøper uten at den ble registrert. Dersom dette var tilfelle representerer dette også en markedsmessig utfordring der norsk fisk får et dårlig omdømme hos kundene. Dårlig kvalitet og variasjon i kvalitet er et dårlig utgangspunkt for å bygge langsiktige markedsrelasjoner til krevende kunder. Dårlig omdømme og lav pris er ofte konsekvensen.

Forvaltningsmessig er juks et nederlag, og i internasjonale fora vil det svekke omdømmet til «verdens fremste sjømatnasjon» – både som motpart i internasjonale forhandlinger og som talsnasjon for langsiktig bærekraftig ressursforvaltning.

Hva har vi lært?

Med utgangspunkt i enkle økonomiske resonnement har vi vist at det er mulig å forstå de viktigste driverne for juks og hvilke metoder som anvendes. Samtidig er det et nederlag for alle at *ryktene* om juks florerer. Manglende tillit blant aktørene, både kjøper og selger, er ødeleggende for den økonomiske utviklingen i en sektor. Det gir også grobunn for en gjennomgående mistanke om at det er uredelighet som skaper vinnere, ikke innovasjon rettet mot å redusere kostnadene og øke markedsverdien av begrensede fiskeressurser. Kunnskap om hva som motiverer for juks er derfor et viktig utgangspunkt for å avdekke og forhindre uredelighet.

Året 2014 ble svært likt 2013 langs mange dimensjoner. Til tross for dette var ikke ryktene om uredelighet like sterke som året før. I vår gjennomgang av hva som motiverer for slik uredelighet finnes flere forhold som kan bidra til å forklare dette. Vi tok utgangspunkt i at store skift i kvotene er en viktig driver for uredelighet. Slike store skift skaper utfordringer i hele verdikjeden. Skiftet i kvotene fra 2014 til 2013 var minimale. I så måte var verdikjeden i langt større grad forberedt på vinteren 2014. Forståelsen av konsekvensene av et så høyt kvantum var dessuten bedre, og i verdikjeden var det etablert kunnskap om hva som måtte til for å håndtere en så høy kvote (på lovlig vis).

Vi har også påpekt at fastsettelsen av minsteprisen er et viktig moment for å unngå kjøpemotstand og derigjennom skape motiv for uredelighet. I så måte var støyen rundt minsteprisfastsettelsen av vinterprisene som en mild bris å regne sammenlignet med situasjonen året før. Prisen var dessuten økt i forhold til 2013 samtidig som kvotene var uendret. Det var altså ikke nødvendig med uredelighet for å opprettholde eller øke inntektene. Fritt fiske for fartøy under 11 meter, som var et nytt reguleringsgrep i 2014, taler også for at motivene for uredeligheter var svekket i denne fartøygruppen i 2014.

Et annet moment som vi har trukket frem er frykten for å bli avslørt. Erfaringene fra 2013, og den oppmerksomheten som uredelighet fikk,

gjorde at kontrollmyndighetene var i alarmberedskap og aktørene var veldig bevisst på akkurat det.

Til syvende og sist er imidlertid det viktigste, for å bekjempe juks, at aktørene anerkjenner behovet for kvotebegrensninger, og at uregelmessigheter i kvoteregnskapet gjør at det skapes uheldige konkurransevilkår i næringen. I så måte var møtene mellom næring og forvaltning høsten 2013 viktig for å bygge opp holdninger som bidro til å at aktørene i 2014 sto imot fristelsene som et svekket kontrollapparat og «kul på havet» representerte.

Marine Policy

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Challenging spatial and seasonal distribution of fish landings—Experiences from vertically integrated trawlers and delivery obligations in Norway

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Show less

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Abstract

The highly seasonal Norwegian cod fisheries give rise to problems downstream in the value chain and the authorities have introduced several schemes to counter the strong incentives for seasonal harvesting. This paper studies how the trawler delivery obligation (TDO) regime influences aspects of the harvesting pattern, focusing on the temporal and geographic distribution of landings. The analysis shows that the trawlers as a group have far less seasonal variations in their cod landings compared to the coastal fleet. While the Norwegian fleet lands about 75% during the first half-year, the corresponding share for trawlers is about 50%. Contrary to the initial hypothesis, the independent trawlers fished the most off-season; about 57% of their total landings. Trawlers controlled by vertically integrated firms landed considerably less (about 45%) and independently owned trawlers with landing obligations fell between these two strategic groups (about 50%). Vertically integrated vessels have a higher fulfilment of their landing obligations than the independently owned. The differences between the strategic groups are relatively high, at 68% vs. 38%. These results indicate that delivery obligations alone are not sufficient to provide control over the geographic distribution.

Keywords

Landing pattern; Trawlers; Delivery obligations; Vertical integration

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The influence of human rationality and behaviour on fish quality

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Highlights

- Address how and why the rationality and behaviours of fishers and fish buyers may influence fish quality.
- Examine why fish of poor quality is sold at a too high price.
- Examine why catches based on long-line is in decline.
- Consequences and policy implications are discussed.

Abstract

This paper discusses the role of human rationality and behaviour with respect to perceptions of fish quality by exploring two intriguing observations of the sale of fresh cod and haddock from the Norwegian coastal fishing fleet to local fish buyers: (1) fish of poor quality is sold at too high a price and (2) catches from the coastal fleet based on long line/hooks, which provides the fish of the best quality, are in decline. These two phenomena are analysed by scrutinising the minimum price system, the power and dependency relationships between fishermen and fish buyers, the use of power by fishermen and fish buyers when negotiating prices and the transaction costs involved in evaluating fish quality. The results show that the first-hand sale of fresh cod and haddock suffers from several market imperfections, which help explain why fish of poor quality gains good prices and why coastal long lining is in decline. We argue that the behaviour of both fishermen and fish buyers represents "social dilemmas" where seemingly rational individual behaviours lead to a situation where everyone is worse off than they otherwise would have been. This article also discusses suggestions for solving these social dilemmas.

Coping with unpredictable supply: the role of flexibility and adaptation

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Abstract

Purpose – This paper aims to address how firms cope when input due to primary uncertainty is unpredictable, and thus timely and adequate supply to customers are impossible to guarantee.

Design/methodology/approach – Two sets of data are applied to capture uncertainties, flexibilities and adaption strategies amongst suppliers and producers respectively.

Findings – The findings show that flexibility is a prerequisite to cope when faced with unpredictable supply. Flexibility comes in many forms. They are partly firm-specific and can be conceived as a valuable resource.

Research limitations/implications – The present study is limited to one industry only.

Practical implications – Unpredictability imposes the need for adaptations, which requires flexibility. However, adjustment to the new landscape is a prerequisite to succeed.

Originality/value – This paper offers insight on how firms cope when needed input to operate is unpredictable, i.e. an almost neglected topic in the marketing literature, where adequate supply in most cases is seen as unproblematic.

Keywords Primary uncertainty, Unpredictable supply, Adaptation and flexibility, Uncertainty management, Supply

Paper type Research paper

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Sustained competitive advantage based on high quality input

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Abstract

It is often observed that some firms perform better than others within a population of firms producing the same products. In this paper, potential sources for creating sustained competitive advantages are addressed. According to the resource-based view of the firm, this phenomenon is rooted in heterogenic firm resources and immobility of key resources. This paper reports the findings from an empirical study of the Norwegian seafood industry. By analyzing internal financial statements in a period of 12 years it is revealed that some firms perform over average compared to its competitors. These firms are said to have a competitive advantage. Based on this observation it is analyzed how firms act to cope with input uncertainty. The firms are grouped according to their relative performance, and it is found that the best performing group is supplied with high quality fresh fish. The paper discusses implications of the findings, both managerial and theoretical.

Keywords

Competitive advantage; Fish processing industry; High quality raw material

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BIOECONOMICS OF CAPTURE-BASED AQUACULTURE OF COD (*GADUS MORHUA*)

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☐ *This study formulates and parameterizes a bioeconomic model of capture-based aquaculture (CBA) of cod (Gadus morhua). The model is solved for the optimal harvest pattern and calculates economic profit and net present value for a model farm. The biological sub-model incorporates knowledge from interviews with existing farmers, research trials and existing cod aquaculture literature. Economic components are obtained from interviews and sales statistics from exporters. A farm of the modeled scale is likely to influence market prices, hence sales prices were estimated assuming a supply response based on the price elasticity. Taking into account the opportunity cost of selling the fish directly, NPV is found to be marginally positive. Sensitivity analysis revealed that profitability is sensitive to changes in several parameters. Hence, further research is valuable and care should be taken when considering investments in cod CBA.*

Keywords capture-based, cod, economics, aquaculture, optimal harvest schedule

TO INVEST OR NOT - RENEWAL OF THE NORWEGIAN BOTTOM TRAWLER FLEET

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ABSTRACT

In order to survive and prosper fishing companies have to balance the need for continuity and change. Investment strategy is a good indicator on the direction companies are headed in terms of capacity, onboard production, and the financial risks they are willing to take. However, the success of an investment does not only depend on company decision and timing, but also how companies tackle unpredicted changes in the competitive environment. Cash flow rise and fall with the quota. Accordingly, successful investment strategies in such settings are often linked to timing and capacity decisions. In this paper we propose a framework that explains the investment strategy behind fishing vessel renewal. The hypothesis that cash flow and profitability impact the decision on when to replace an old vessel with a new is tested by studying the pattern of renewal of Norwegian bottom trawlers in a closed fishery. Results suggest that the decision of renewal is taken on rising quota, just before it peaks. Due to long planning and construction time new vessels are operational under conditions very different than predicted. Declining quota and revenues provides challenging conditions, especially for companies building new vessels. However, companies building new vessels have better economic performance than companies not renewing. And vessels being renewed have more fishing licenses than other vessels. An important observation is that the ITQ system has prolonged renewal, as companies buy licenses rather than new vessels. On rising quotas, owners of fully licensed vessels renew 25% of the Norwegian fleet in 2012-2014.

INTRODUCTION

Production of food is based on harvesting from nature. Some food production concepts are more exposed to unpredictable environments than others. One of the most risky concepts is harvesting from wild fish stocks. The wild fish stocks fluctuate as a result of environmental variations on many unpredictable factors like sea water temperature, feeding conditions and development in predating stocks. In addition accessibility for fishing depends on stock migration pattern and climate conditions as well as fishing effort. Based on these variations fishermen skills and technology are developed to reduce uncertainty and improve efficiency in harvesting from wild fish resources. Public authorities also contribute to the struggle by improving knowledge on how commercial stocks develop and thus try to modify the management regime in order to create stable and predictable conditions for fishing companies to invest and prosper.

However, looking at variation in quota, landing, cash flow and fleet structure, fluctuation seems to be a more proper notion than stability. One key challenge in such business environment is how to invest, in particular when to invest, what technology to select and capacity to choose. The way companies face these challenges is multiple. The most obvious way is to defer (Hart, 1940) renewal of vessels and rather put financial resources in maintenance. Often the result is an outdated fleet. In 2010 for instance, one of the most important vessel groups in Norway – bottom trawlers, the newest vessel was ten years, the average vessel was 19 years, and the oldest vessel was 38 years (Larsen and Dreyer, 2012).

Observations reported indicate that the renewal of fishing vessels is not a continuous one, but rather that the introduction of new vessels is concentrated in short periods of time. From theory this is well known in fisheries where a new species is discovered and opened for commercial fishing. This indicates that first

mover advantages (Lieberman and Montgomery, 1988, 1998) or changes in management regimes trigger a wave of new vessels introduced to fisheries (Foley et al 2011). Another trigger might be technology improvements allowing value adding under fixed quota (Bendiksen et al 1999).

However, independent of changes in accessibility related to new species and technology improvement, old vessels need to be replaced by new ones. One strategy, to reduce the cost of replacement, known from other industries and markets, is to make use of the second hand market. In a closed fishery there will be no well-functioning second hand market when no new vessels are built or vessels from other fisheries are for sale. In line with this there has been reported a wave of renewal in a fishing fleet when relatively new second hand vessels have been introduced from one closed fishery to another. For instance, the fall of the Soviet Union formed a global second hand market as Russian fishing companies replaced old and outdated vessels with second hand vessels from other countries (Nilssen, 2003). Norway was an important supplier of such vessels which strongly contributed to the renewal wave occurring in Norway around 1990. This implies that a functioning second hand market can be an important factor in explaining renewal strategies.

The starting point of this paper is the observation that in a closed fishery the renewal of vessel is concentrated in short periods of time. Our intention is to improve our understanding of this phenomenon. In doing so, we explore the dynamics in renewal of fishing vessels in a closed fishery. In the period studied the renewal of vessels is concentrated in at least two significant "waves". To explain this phenomenon we include the variation in quota of the main target species for this fleet. We also look at the number of new vessels and licenses on each active vessel during the period studied. Cash flow is used as a measure on economic performance in the proposed framework. The collective aim is to gather sufficient information to predict the renewal dynamics in the fleet.

The paper continues as follows. In the next section we introduce three propositions based on observable perspectives like variation in cash flow and quota, the number of licenses per vessel and the number of new vessels. In the third section we describe the data, introduce the methodology and formulate testable hypothesis based on the propositions proposed. The fourth section contains the results from the empirical testing. The final section contains a short conclusion with possible implications derived from findings.

PERSPECTIVE

Our port of departure is fishing and renewal of fishing vessels. In choosing factors important for cash flow in such an activity and asset, accessibility to a commercial interesting biomass and allowance to harvest from it is crucial. As over-fishing has been an important issue in most large-scale fisheries, public authorities have often implemented restrictions both related to total allowable catch (TAC) and number of fishing licenses. Thus, the most crucial factor when it comes to future cash flow is how the biomass develops in years to come. Obviously, the condition of the biomass depends on uncertain physiological, biological and ecological factors. But also human action, i.e. the way fisheries are managed and operated in terms of quota and fishing rights, are important for both short and long term cash flow at vessel level.

As we focus on the decision of renewal of fishing vessels, catch capacity and capacity utilization are important. These are not fixed factors but factors that continuously change as technology develops. Renewal often represents a significant increase in capacity. Capacity might also change as a result of maintenance or reconstruction of old vessels. However, capacity utilization in a closed fishery at large depends on quota, number of vessels and number of fishing licenses per vessel. Accordingly, variations in biomass and management regime are crucial for the capacity utilization.

Based on these arguments, and empirical findings reported, we predict that a renewal wave of vessels in a closed fishery will follow the quota variation and catch per unit effort. However, the timing of renewal

among different vessel owners will depend on company level factors (Barney, 2002) like knowledge, financial position and slack in capacity. The investment decision studied, i.e. to renew or not, depends on the risk attitude among vessel owners and investors.

The climate for renewal will improve as the quota increase, indicating that renewal are more likely to occur after a period of continuous growth in vessel quotas than in periods with stable or even decrease in vessel quota. First movers (Lieberman and Montgomery, 1988, 1998), i.e. those vessel owners that renew their vessel first in a period of quota growth, are more likely characterized by higher cash flow than late movers, deferring to order new vessels.

Accordingly, we propose;

Proposition 1: In a closed fishery the renewal of vessels will follow the fluctuation of the quota
Proposition 2: The first movers are characterized by higher cash flow than late movers.

In order to increase the pace of renewal and to improve cash flow, the public authorities can intervene by adjusting the rules of the game and e.g. allow an increased number of licenses on each vessel (Hermansen and Dreyer, 2010; Hermansen et al, 2012). However, there will be a short term tradeoff between investing in new licenses and the return on invested capital. In a period after introducing this possibility, vessel owners will adapt differently to the new management regime dependent of their strategic position.

Some vessel owners are in a position where they are able to add more licenses to their vessel, others not. This position varies along dimensions like slack in capacity and financial strength. The market for fishing licenses is also important. Some vessels are in a position where they can avoid the market for licenses if they are a part of a multi vessel company. If a company owns several vessels, they can use the second hand market to sell a redundant vessel at a fair price, and move licenses over to newer and more efficient vessels. Multi-vessel companies are also in a position, if sufficiently solvent, to sell and order new vessels at different point in time and thus exploit first mover advantages.

Other vessel owners, however, might be in a strategic position where they are unable to exploit the possibilities opened. Insufficient financial resources, slack in capacity or great demand for fishing licenses make both adding more licenses and vessel renewal too risky. Being in such position it is likely that the new option rather represent an attractive exit strategy from the industry, i.e. both license and a vessel are offered for sale.

Based on these arguments we propose the following to occur when introducing an individual transferable quota (ITQ) system in a closed fishery;

Proposition 3: Only after the vessels have reached the maximum number of licenses allowed the owners will start renewal.

In a closed fishery with an ITQ system, owners will prioritize to accumulate fishing licenses over vessel renewal.

DATA

The issues addressed in this paper require good quality panel data. For example, we need to study a cross sectional sample of vessels representing the entire fleet over some time to get sufficient variation to conduct empirical analysis. Structural shifts are important too as management regime changes will affect vessel owners choice of strategy and performance. Fish stock condition and quota are perhaps the strongest drivers to economic performance for the vessels. Hence, the stock and quotas need to fluctuate sufficiently in the period studied.

The data used in this study is collected by the Norwegian Directorate of Fisheries and organized by the authors. It consists of annual financial statements for each vessel submitted by vessels owners. Accounting reports are available for the years 2000 to 2010.

Data on quota and vessel renewal are available for the years 1980 to 2014. For 2013 and 2014 we use the quota predictions from the Institute of Marine Research (www.imr.no/en). Vessels owners are eager to announce when they have signed a contract for a new vessel. Since the construction period takes two to three years, we know with good certainty today which vessels that will be renewed the next two years. Table 1 contains descriptive statistics on the variables used in this study.

Table 1. Descriptive statistics from 2000 to 2010.

Variable	Obs.	Mean	Std. Dev.	Min	Max
New vessels	364	0.16	0.37	0.00	1.00
Quota (in tonnes)	364	211861	23597	192500	271000
EBITDA (in million NOK)	364	4.33	6.41	-26.86	23.69
Number of licenses per vessel	364	1.52	0.73	0.23	3.00

The variable "New vessels" is a dummy variable represents vessels being replaced by new vessels from 2012 to 2014. These vessels are also referred to as first movers. In 2010 the entire fleet consisted of 41 vessels[i]. 11 vessels are scheduled to be renewed in 2012 to 2014, more than one quarter of the entire fleet. In the 2003 to 2010 period, and especially after 2005 when the ITQ system was made more attractive, major restructuring took place. The consequence was that not a single new vessel was built. Cash flow is measured as EBITDA, which reflects earnings before interest, taxes, depreciation and amortization.

Norwegian bottom trawlers

The setting chosen for this study is the Norwegian bottom trawlers. This fishery has been closed since the late 1970s. Accordingly, there is a fixed number of fishing licenses. The main target species are cod, haddock and saithe. The target species have been regulated with TAC where the bottom trawlers share a more or less fixed part of the Norwegian part of TAC, annually set by Norway and Russia together. Some of the vessels are also allowed to fish prawns in the north Atlantic.

Poor profitability and slack in capacity led to an old and outdated fleet. From 1990 owners where allowed to transfer two time-limited (13-18 years) licenses[ii] to an existing vessel resulting in a maximum of three licenses per vessel. From 2005 added licenses where made perpetual, adding attractiveness to the scheme. The scheme's objective was to help the fleet to adapt capacity, improve efficiency and financial performance.

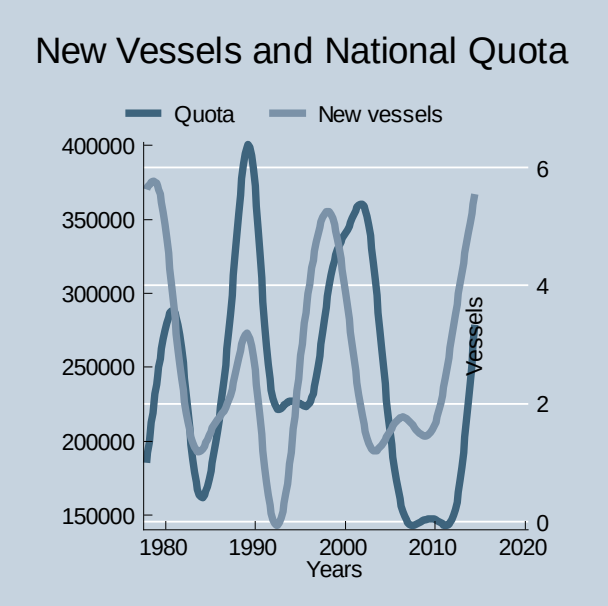

Figure 1. The Norwegian quota of North East Atlantic cod from 1990-2014 and number of new bottom trawlers (3 yrs. moving average).

In figure 1 we have plotted the annual variation in the quota (in tonnes) from 1990 till 2014[iii] and the number of new vessels entering the fishery. Cod is the single most important specie for this fleet. As illustrated in the figure the vessel owners are exposed to a biological resource that fluctuates strongly and makes investments decision related to capacity and renewal both complicated and risky.

METHODOLOGY

Based on our data and the propositions proposed above we have generated three empirical hypotheses that we will test.

The first hypothesis (proposition 1) states that the correlation between quota and new vessels is zero. A rejection implies some kind of relationship. We expect quota to be positive correlated with new vessels. Due to time lag between company decision to build new vessel and vessel entering fishery we expect the correlation to be stronger with a lagged quota variable, possible with 2-3 year time span. We use data from 1980 to 2014 (see figure 1).

The second hypothesis (proposition 2) states that first movers and late movers have equal accumulated cash flow in the years prior to renewal. We use a simple linear regression model to test whether new vessels as a binary independent variable significantly impact cash flow as the continuous dependent variable. We expect cash flow to be significantly higher for first movers than late movers, thus rejecting the hypothesis. We use data from 2003 to 2010, which is a period where no new vessels were built.

The third hypothesis (proposition 3) states that first movers and late movers have an equal number of licenses per vessel. This hypothesis is tested using a simple linear regression model with the number of fishing licenses as the dependent variable and first movers as a binary independent variable. We expect that the number of fishing licenses to be significantly higher among first movers than late movers, thus rejecting the hypothesis.

RESULTS

All empirical analysis was conducted using the STATA software. Hypothesis 1 was empirically tested by correlation analysis. Results in table 1 suggest that the covariation between new vessels and quota is largest with a lagged quota. In other words, a peak in new vessels occurs 1-3 years after a peak in the quota. This is in line with the practice of building new vessels which is known to take 2-3 years from company decision is taken until the vessel operate. We reject hypothesis 1 and conclude that the fluctuation in quota is a significant input to the company's renewal strategy. The decision to build new vessels seems to be taken a year before or the same year as the quota peak.

Table 1. Correlation Analysis of Quota and New Vessels.

	Correlation Analysis	
	New vessel	*p*-value
Quota	0.254	0.124
Quota (1 lag)	0.466	0.004
Quota (2 lags)	0.503	0.002
Quota (3 lags)	0.407	0.015
Quota (4 lags)	0.203	0.249
Quota (5 lags)	-0.014	0.937

Hypothesis 2 was empirically tested using a linear regression model. Results in table 2 suggest that first movers have almost 5.3 million kroner higher accumulated cash flow than late movers over the 2003 to 2010 period.

Table 2. Linear regression model testing hypothesis 2.

	Accumulated cash flow	
	Coefficient	t-value
Constant (A_1)	10.493	10.42*
New vessels (A_2)	5.271	2.11*
F-value	4.44	
N	364	
R-squared	0.013	

** indicate $p < 0.05$*

Hypothesis 3 was empirically tested using a linear regression model. Results in table 3 suggest that first movers have accumulated 0.57 more fishing licenses than late movers.

Table 3. Linear regression model testing hypothesis 3.

	Number of fishing licenses	
	Coefficient	t-value
Constant (B_1)	1.432	35.71*
New vessels (B_2)	0.566	5.68*
F-value	38.28	
N	364	
R-squared	0.082	

** indicate $p < 0.05$*

Results suggest that hypothesis 1, 2 and 3 are rejected. This implies that the propositions seem to describe the industry fairly accurate. By statistical tests we infer that vessels renewing in 2012-2014 have higher cash flow than vessels not renewing. We also find that the renewing vessels have more fishing licenses than vessels not renewing. We therefore, indirectly, suggest that there is a link between higher cash flow and more fishing licenses, and that the former comes as a result of the latter. We do, however, not establish any causality by statistical testing, nor do we try to explain further why first movers have higher cash flow than late movers. There are surely other factors not taken into account in this study that affects cash flow and a company's ability and willingness to accumulate fishing licenses and operate efficiently.

CONCLUSION

In this paper we examine the dynamics of renewal of the fleet in a closed fishery. The TAC of the target species, i.e. Northeast Arctic cod, fluctuates strongly in the period studied. To help the fleet in improving its profitability and adapting the capacity the public authorities introduced an ITQ system, allowing vessel owners to increase quota and catch per vessel.

Our findings are as follows. In the closed fishery studied the renewal of vessels follow the fluctuation of the quota. However, the new vessels ordered operate for the first time 1-3 years after the TAC has peaked. This can be explained by the time lag between the order was placed and the vessel operate. This result indicates that a renewal wave tends to peak shortly after TAC and cash flow starts to decrease.

First movers, i.e. owners replacing old vessels by new vessels, are characterized by higher accumulated cash flow than late movers. First movers also have accumulated more licenses than late movers, which strongly contribute to higher accumulated cash flow. Improved financial strength creates favorable conditions for investments. The timing of vessel replacements is not optimal as the new vessel will operate on declining quota. The selling price will most likely decline as the supply of used vessels increase. At the same time the price of the new vessel might be higher as shipyards face increased demand. Going counter-wave, i.e. ordering new vessel when shipyard activity is low and second hand market is good seems to be a more optimal strategy. Such strategy demands that companies are in a good financial state, and that the authority govern the business in a predictable manner.

The last decade this fishery has faced major restructuring as the number of vessel was reduced from around 100 to 40. Early in the decade vessel owners chose to buy fishing licenses rather than ordering new vessels. Toward the end of the decade, however, the more aggressive owners reached the maximum number of licenses allowed on a single vessel (figure 2). A healthy fish stock led to an increase in quota. Economic performance was good and the climate for renewal deemed very favorable. The result is seen today, the total number of vessels seems to stabilize and more than one quarter of the fleet is renewing. This is a good example that the authorities indirectly decide when fleet renewal occurs.

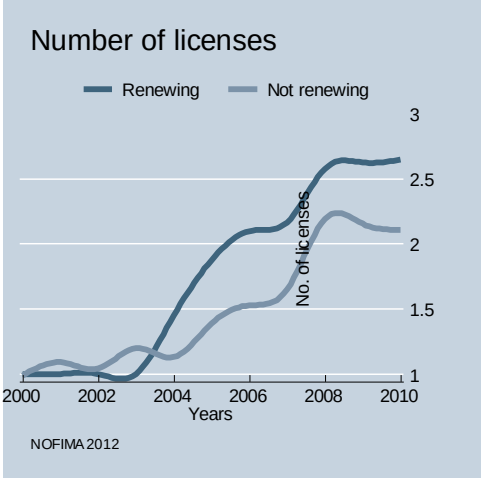

Figure 2. Number of licenses amongst first movers (renewing) and late movers (not renewing).

Allowing owners to add more licenses per vessel seems to have been a successful way of adapting capacity and improving cash flow to the Norwegian bottom trawlers. If this cure is transferable to other fisheries is to be seen. Larsen and Dreyer (2012) indicate that the fleet is close to capacity limit if one judge by the number of days at sea. The present annual growth of 25% of the TAC for Northeast Arctic cod, will further stress the fleet capacity. However, according to history the renewal wave we now experience will be followed by a significant fall in TAC. If (or perhaps more correctly when) that happens, the cash flow will fall and owners will once more argue for rising the maximum number of licenses allowed per vessel to protect yesterday's investment, and ensure future renewal.

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[i] Our data contains 34 of the 41 vessels in 2010.
[ii] Authorities set the maximum allowable catch per license annually, but can be adjusted more frequently when redistribution across groups occurs.
[iii] Years 2013-2014 are based on Institute of Marine Research (www.imr.no/en) quota advice.

WHEN, WHERE AND WHAT TO FISH? FISHERMEN'S BEHAVIOUR WHEN CHOOSING OPTIONAL SEASONAL PROFILES.

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ABSTRACT

Most fishermen are faced with several options in both long and short term planning of their activity. In this paper we study fishers short term decisions when different seasonal fishery options are available. This involves choices of spatial and temporal allocation of effort as well as use of varying fishing gears in order to obtain the planned target specie mix. In a heterogeneous fishing fleet the seasonal options may differ considerably from vessel to vessel, also depending on its home port. The paper presents a framework wherein the seasonal choices are understood on the basis of economically rational behaviour where expected marginal benefit of the different options are evaluated and the most profitable season chosen. A monthly model is developed to describe the marginal profitability of the various fishing opportunities based on Norwegian data. The impact management decisions may have on the chosen seasonal profile and the vessel profitability is then discussed on the basis of the presented seasonal model. In particular we study the impacts of different quota allocation regimes. A diverse fleet structure may be an efficient response on highly fluctuating and unpredictable fish resources, while fisheries regulations may have the effect of reducing the flexibility by which the fleet can respond to such changes.

INTRODUCTION

Humans in general make a vast number of decisions every day, but only a fraction of them involve active decision processes. When planning the activities of a medium sized firm, of which a number of people depend upon for their livelihood, it is reasonable to assume that more resources are devoted and that an analytic and rational decision process is employed.

Fishing vessels in general often have a number of options with tradeoffs between them available when planning their fishing activity. At the core, choices have to be made about where, when and what to fish given their resources and constraints in order to achieve the desired utility and economic return. Decisions are made at different timescales with an overall plan for the year and more detailed plans for each fishing season within the year and day-to-day decisions on the fishing grounds. Depending on the context the vessel is operating in, these may be highly complex problems involving many variables and high uncertainty.

Research question

The fishing pattern can vary considerably between individual vessels. This diversity may be due to several factors; different technical characteristics, knowledge, experience, other internal resources such as quotas or responses to the large uncertainty. But it may also be due to lack of explicit decision making processes. Software for assistance in planning and to calculate the economic implications of specific choices may not be available.

This study focuses on the large Norwegian groundfish trawlers with a research objective to describe the optimization problem facing a vessel manager and to develop a mathematical model for finding the optimum fishing pattern for a trawler. Although larger fishing companies have developed in-house

programs, senior representatives from these have expressing the need for assistance in such planning. The results from the model will be compared to the actual harvest pattern and discussed.

A number of studies have investigated fishing strategy choices. Lane [1] studied salmon freezer trollers using Markov decision process. Babcock and Pikitch [2] used a dynamic programming model to study target species assemblage in a multispecies trawl fishery at the US west coast. Choice of fishing location has been widely studied, and the methods are reviewed in van Putten *et al* [3]. Larkin and Sylvia [4] studied how intrinsic quality influenced the intraannual harvest schedule. To our knowledge, no studies have taken into account seasonal variability in catch rates.

Case fleet and fisheries

The case vessels employed in this paper is the Norwegian groundfish stern trawler fleet. Introduction of an ITQ regime has seen the fleet being reduced from about 100 in 2000 to about 40 vessels at present [5]. Their primary catch is cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and saithe (*Pollachius virens*). The vessel group's total catches in 2010 is shown in table I. Shrimp (*Pandalus borealis*) is also of some importance and other fish is generally caught as bycatch.

Table I Catches from Norwegian codfish trawlers in 2010

Specie	Quantity (tonnes live weight)
Cod	86,705
Saithe	89,737
Haddock	61,546
Shrimp	16,417
Redfish	7,456
Greenland halibut	3,734
Other	1,969

Cod, haddock and saithe are all managed by individual vessel quotas. Other species are generally caught as bycatch in these fisheries, some with individual quotas and some through a maximum allowed share in the primary fisheries. Most of the vessels have licenses for shrimp where the vessels are not restricted by quotas. The saithe and shrimp fisheries can be considered close to single-species fisheries. The catch composition in the cod and haddock fisheries can to a large extent be influenced by the skipper. This results in fisheries that range from single specie of cod through mixed fisheries to single specie haddock.

Their activity is primarily located to the Barents Sea and fishing banks in vicinity of the North-Norwegian coast. A large share of their saithe catches are taken in the North Sea. Most of the trawlers are equipped for freezing the catch onboard, and this is reflected in the landings where about 90% are frozen.

The fisheries the trawlers participate in exhibit large annual variation in important characteristics. This is common in high latitude areas where the sunlight and temperature varies strongly. Of particular importance to the trawler operations are catchability, sexual maturation and fillet yield. Eide *et al* [6] studied trawler logbook data and found that the cod catchability varied harmonically with time with a low at about 1/3 of the peak. For the coastal fleet, being far less mobile and thus more dependent on the fish migration pattern, the variations in catchability is even more pronounced [7].

This description gives some insight into the complex decision problems facing the trawlers' managers. Observing the individual vessels' landing pattern, it becomes clear that the managers come to quite different solutions to these effort allocation problems. Figure 1 shows how the vessels distributed their

catches of cod, haddock and saithe in 2011. The unit of measurement is each vessel's monthly share of its own total catch of the specie in question. For cod the highest average landings are found in January with about 20% of the total cod catches. The lowest share is landed in March at just 2% of total catch. What is more interesting is that the variation between vessels is relatively high, in a single month a vessel may land from 0 while another may land 40% of its cod catches.

For haddock and saithe the variation between vessels is even more pronounced, but there is here a stronger seasonal signal as well. Haddock is mostly caught from April to September and saithe from February to September.

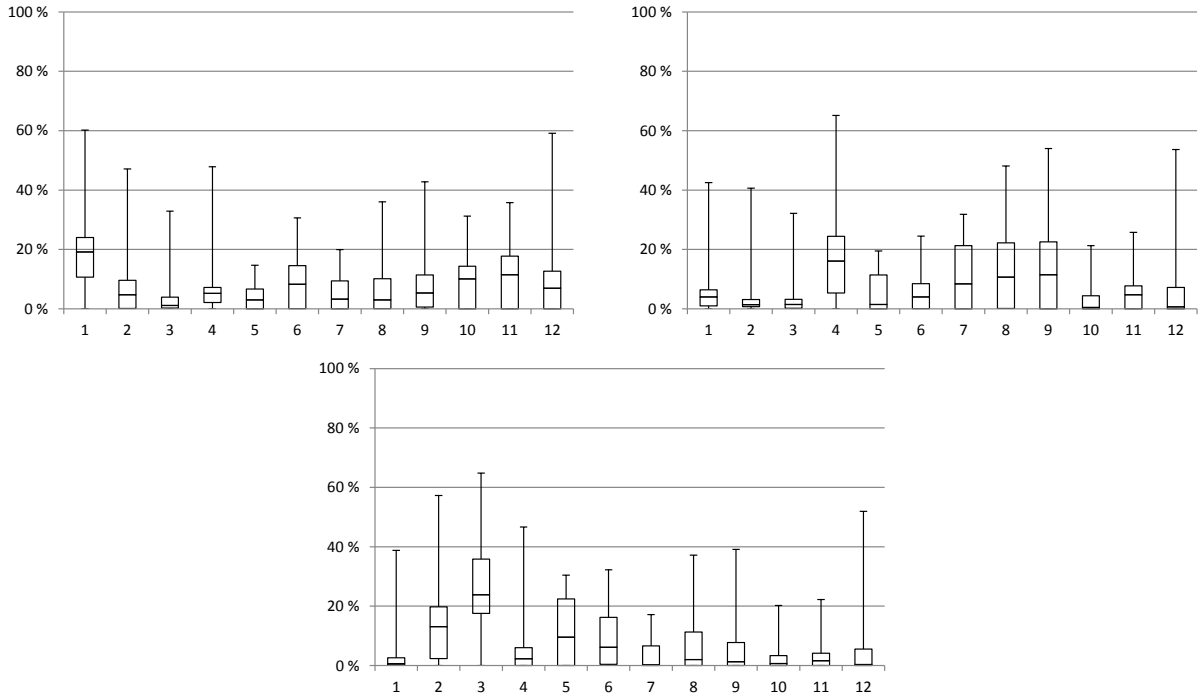

Figure 1 Box-plots of individual vessels share of the vessel's yearly catch of cod, haddock and saithe per month in 2011 (clockwise from upper left). Data from the Norwegian Directorate of Fisheries.

To further describe the variations between vessels in their harvesting pattern, we have divided their activities in five separate fisheries; the four top species caught and a "mixed" fishery. The first four is defined as when the specie in question account for more than ¾ of the monthly landings. The remaining observations are classified as mixed fisheries. The results are presented in table II. There is a clear pattern with cod in January, saithe from February to March, mixed from April to September and cod/mixed from October to December. Still, many vessels depart from this pattern and chose other harvesting patterns. To name a few deviations, some do not take part in saithe or shrimp fisheries, some catch all their cod and haddock through the mixed fishery and some are idle most of the year.

Table II Harvesting pattern for individual Norwegian trawlers per month in 2011

Vessel	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1		Sai	Mix	Shr	Mix	Cod	Mix	Sai	Shr	Mix	Mix	Mix
2	Cod	Cod		Mix	Cod	Cod	Mix	Had	Cod	Mix	Cod	
3	Cod	Sai	Sai	Mix		Cod	Mix	Mix	Had	Cod	Cod	Cod
4	Mix	Sai	Cod	Mix	Sai	Mix	Sai	Mix				
5	Cod	Mix	Sai	Mix	Mix	Mix	Had	Had	Mix	Mix	Cod	Mix
6	Cod	Mix	Sai	Mix	Mix	Mix	Had	Mix		Mix	Cod	Mix
7	Mix	Mix	Mix	Shr	Shr	Shr	Shr	Shr	Shr		Mix	Mix
8	Cod	Mix	Sai	Mix	Mix	Sai	Mix	Mix	Mix	Mix	Mix	
9	Cod	Cod	Sai	Mix	Mix	Mix	Mix	Mix	Mix	Cod	Cod	
10	Cod	Sai	Sai	Had	Mix	Mix	Mix		Mix		Cod	Mix
11	Cod	Sai	Sai	Shr		Mix		Shr	Shr		Mix	Mix
12	Cod	Sai	Sai	Mix	Mix	Mix			Mix		Cod	Cod
13	Cod	Sai	Sai	Had	Sai	Sai	Sai	Mix	Mix	Cod	Sai	Sai
14	Cod	Sai	Sai	Mix	Mix	Mix		Mix	Mix		Cod	Mix
15	Cod	Mix	Sai	Mix	Cod	Mix		Mix	Cod	Mix		Mix
16		Sai	Sai	Sai	Sai	Mix		Sai	Sai	Mix	Sai	Sai
17	Cod		Sai	Mix	Sai	Mix	Had	Mix	Mix	Mix	Mix	Mix
18									Sai	Mix	Mix	Mix
19		Cod	Mix	Mix								
20	Cod	Sai	Sai	Had	Mix	Mix		Mix	Mix		Cod	Mix
21		Mix	Mix		Mix	Mix			Mix		Mix	Cod
22	Mix	Sai	Sai	Mix			Sai	Mix	Mix	Cod	Mix	
23	Cod	Mix	Sai	Mix	Mix	Mix	Sai	Had	Had	Mix	Mix	Cod
24	Cod						Mix	Mix	Had	Mix	Mix	Mix
25	Cod	Cod	Mix	Mix	Mix	Mix	Mix	Mix	Mix	Cod	Cod	
26	Cod	Cod										
27	Mix	Mix	Sai	Mix	Mix	Mix	Mix	Sai	Had	Cod		Mix
28	Cod	Mix	Mix		Shr	Sai	Shr	Had	Had	Mix	Mix	Mix
29	Cod	Cod	Mix	Mix	Mix	Mix	Mix	Mix	Had		Mix	Cod
30	Mix	Cod	Mix	Mix	Mix		Mix	Cod		Cod	Cod	Shr
31		Mix	Mix	Mix	Mix	Mix	Mix	Mix	Mix	Mix	Mix	Mix
32			Sai	Mix	Sai	Mix	Mix	Mix	Mix			
33	Cod	Sai	Sai	Mix	Mix	Mix	Mix	Mix	Mix	Cod	Mix	Sai
34	Cod	Sai	Sai	Had	Had	Sai	Sai	Mix	Mix	Cod		
35	Cod	Sai	Sai	Sai	Shr	Mix	Had	Had	Shr	Mix	Mix	Cod
36	Cod	Cod	Cod	Mix	Mix	Mix		Mix	Had	Mix	Mix	Cod
37	Cod	Mix	Mix	Had	Mix	Mix	Mix	Cod	Mix			
38	Cod	Cod	Mix	Mix	Mix	Mix	Mix	Had	Had	Cod	Mix	

MODEL AND DATA

This section describes the optimal control model and data that is developed and employed to analyze the research question. First a general overview of the model is given; next each element is described in more detail.

This study serves as a first stage analysis where the problem is described and a simplified deterministic model is developed. This will be enhanced and refined with better data and taking stochasticity into account in future studies. The model is developed in continuous time in the computer software Wolfram Mathematica v. 8. We have assumed a model vessel with a given cost structure. This vessel can participate in five separate fisheries. Each of the fisheries has a given catch and catch composition. Sales prices for each fish species are known. These data are utilized to calculate the marginal profit from participating in each fishery and search for the most profitable sequence of fisheries constrained by quotas in each fishery.

The model does not explicitly take into account the geographic location of the fishery and thus the costs of steaming to and from port and that this time is not available for fishing.

Fisheries and revenue

The trawlers have a number of fisheries options available. As mentioned, saithe and shrimp fisheries are conducted with little bycatch and can be considered single-specie fisheries. Cod and haddock can be caught in a mixed fishery, where the skipper by selecting fishing grounds and gear design to a degree can control the composition. This is illustrated in the four-dimensional plot in figure 3. The axes determine the relative share of the catch and the bubble size determines the quantity of cod. From the plot we can see that cod are caught in a mix with both saithe and haddock, but predominantly the latter as the bubbles are skewed towards the bottom in the plot. The composition varies from almost exclusively cod to high shares of haddock. This variability makes it difficult to model one or more "fisheries" for cod and haddock. For modeling purposes, we have implemented this through defining a "cod" fishery, a "haddock" fishery and a mixed fishery with a defined composition.

To estimate the catch associated with each fishery option, the Norwegian Directorate of Fisheries has supplied us data on each vessel's landings in 2009-11. The data contain landing date, quantity, value and specie. We first categorized each landing according to fisheries. Landings with more than ¾ of the catch consisting of one species were categorized as single specie fisheries. Landings with less than ¾ and more than 1/3 cod and haddock were categorized as "combi" fishery.

The difference between the landing date and the date of the previous landing was used to estimate tour length and calculate catch rate per day. The observations were sorted and averaged to obtain an estimate of catch rate per day for each fishery and month of the year. These observations were them used to estimate a continuous function for catch rates with functional form given in eq. 1 in order to capture the seasonal variations.

$$Catch_{fm} = h - s \cdot \sin[(t - p) \cdot 2\pi], \qquad \text{(Eq.1)}$$

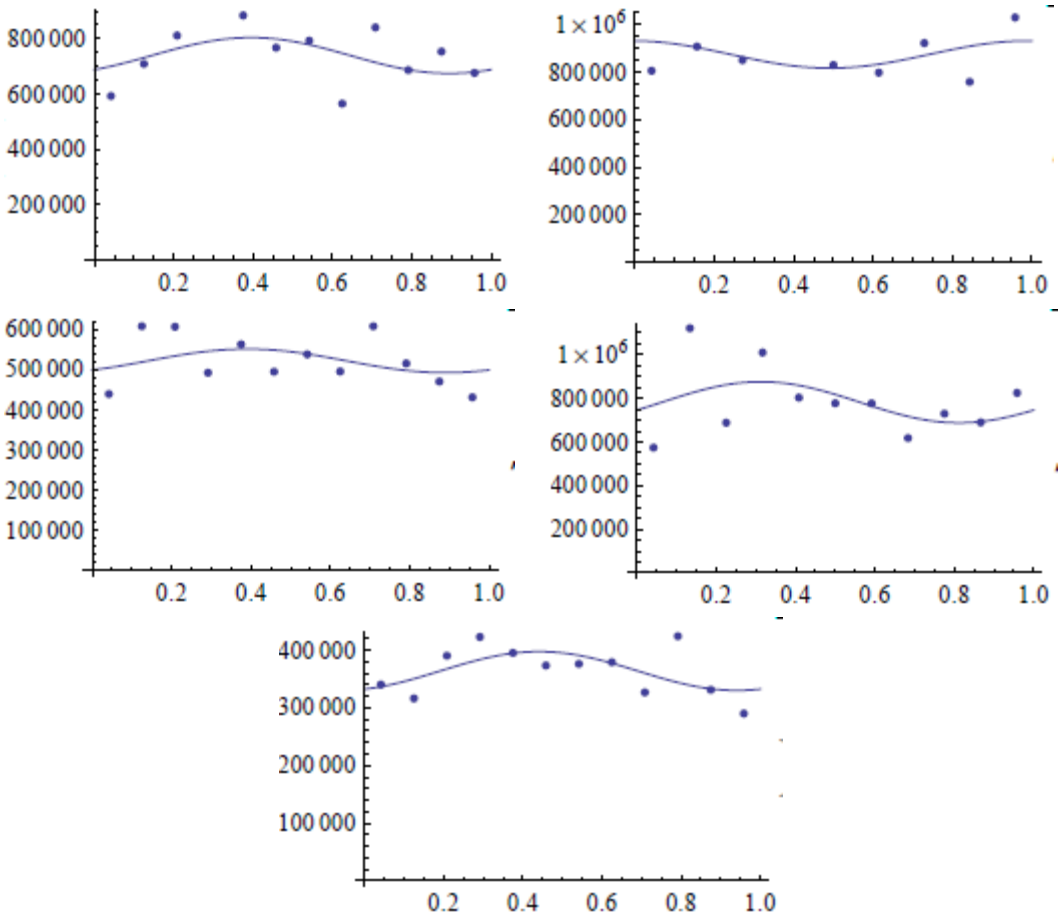

Figure 2 Modeled monthly catch rates (kg) for cod, haddock, saithe, combi and shrimp fisheries (successively from top left)

The results from the nonlinear regression are shown in fig. 2. The cod fishery is estimated to have a top in April/May at about 800 tonnes per month and bottom out in late October at 650 tonnes per month. The same general pattern, with a top in spring/summer and bottom in autumn/winter is found for saithe, combi and shrimp. Haddock has the opposite pattern, with low catch rates in summer and high during mid-winter.

Bycatch associated with each function was also estimated from data and the same harmonic functional form. Revenue is calculated by multiplying catches with sales prices. Average observed prices for each month are employed.

Costs

Only the variable costs of fishing are relevant for short-term decisions about where to allocate fishing effort. The Directorate of Fisheries carries out an annual profitability study of the Norwegian fishing fleet, sampling accounting figures from randomly selected vessels [8]. This does, however, not break down elements into variable and fixed costs. We have therefore assumed that sales fees, fuel and labour variable make up the variable costs and that there are no fixed elements in these items. Based on the survey results from 2010, fees make up 3% of revenue. Crewmembers are generally paid a percentage of revenues less other variable costs. There is also an element of fixed payments for officers, but this is small and disregarded here. Using data from the profitability survey for trawlers, we employ a crew share of 40% of revenues less fees and fuel costs.

Fuel costs are considerably more difficult to model, and a simplified approach is employed here. Fuel is primarily consumed associated with towing the trawl. Different species have different swimming speeds, and therefore require correspondingly different towing speeds and fuel consumption for the trawler. We have access to detailed fuel consumption figures from one trawler for one year. These observations form the basis for species-specific fuel cost-catch relationships. We have assumed that fuel use per day has both a fixed and variable component according to the following equations. Fuel price is assumed 5 NOK/l (about 0,8 USD/l). F is fuel consumption and H is daily harvest.

$F_{cod,haddock,combi} = 0{,}05 \cdot H + 3692$, (Eq. 2)

$F_{saithe} = 0{,}075 \cdot H + 3838$, (Eq. 3)

$F_{shrimp} = 0{,}17 \cdot H + 6375$, (Eq. 4)

Quota restrictions

Catch for most species is restricted by quotas. Due to an ongoing ITQ-regime, these vary between vessels. Vessels can also be allowed to fish another vessel's quotas short-term, in case of mechanical problems, further aggravating differences between vessels. Table III presents the average, maximum and minimum catches for the vessels in 2011. There are relatively large differences for all species, especially for haddock, saithe and other species, where some vessels catch very little compared to the average and maximum catch. More than half the vessels do not participate in the shrimp fisheries. Based on the quotas of an example vessel, we set the quotas restricting the model vessel to 1 950, 1 250 and 1 450 for cod, haddock and saithe, respectively.

Table III Average, maximum and minimum catches per vessel 2011 (shrimp limited to participating vessels)

	Cod	Haddock	Saithe	Shrimp	Other
Average	2 700	1 915	1 697	1 099	293
Max	4 214	3 648	4 700	3 041	1 179
Min	912	37	47	238	6

Reward

Revenues are prices multiplied with catch. The prices employed here are actual monthly average prices obtained by the Norwegian trawlers in 2011 for catch frozen at sea illustrated in Fig. 3. Shrimp receive the highest prices and rose during 2011. Cod is valued at about 4 NOK/kg less and saithe and haddock about a further 3 NOK/kg less.

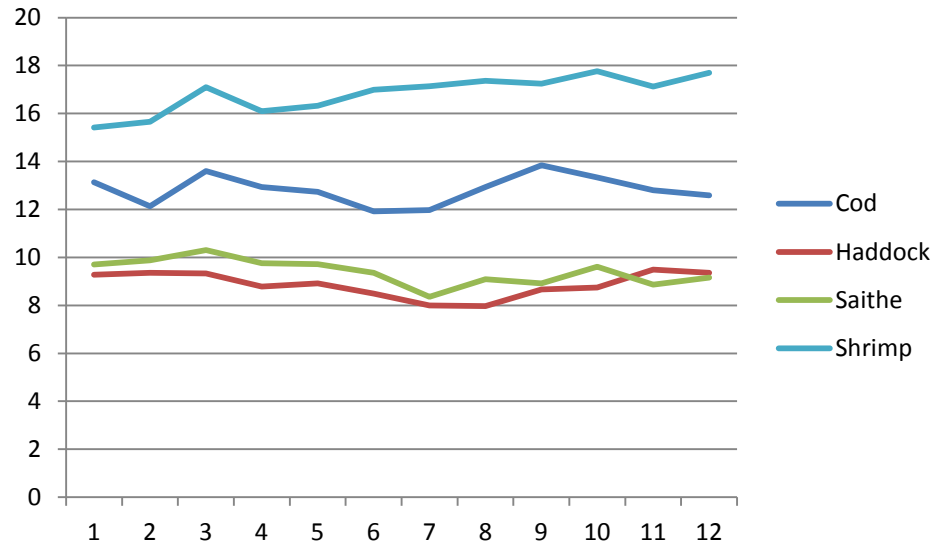

Figure 3 Monthly average prices (NOK/kg) for frozen catch employed in the model (Data: Norwegian Directorate of Fisheries)

RESULTS

Combining catch rates with costs and revenue information yields profit curves for each of the five fisheries options as shown in Fig. 4. The model shows relatively large differences in profitability within the year for most fisheries. For cod, marginal profit varies from 7 500 to 8 500. The differences are most notable for the haddock fisheries, varying from 6 400 to 9 000. These differences imply that how fishing effort is distributed over the year may have large influence on profits.

We also note that there are relatively large differences in profits between fisheries. Particularly saithe and shrimp fishing is clearly less profitable than the three other fisheries.

With no quota restricting vessel activities, a rational vessel plan would operate at the envelopment curve at all times. During the year, there are several shifts in which fisheries is more profitable. From January through February, haddock fisheries tops, followed by a short period of combi fishing. From about mid March to mid September, cod fishing is at the front followed by haddock fisheries for the rest of the year.

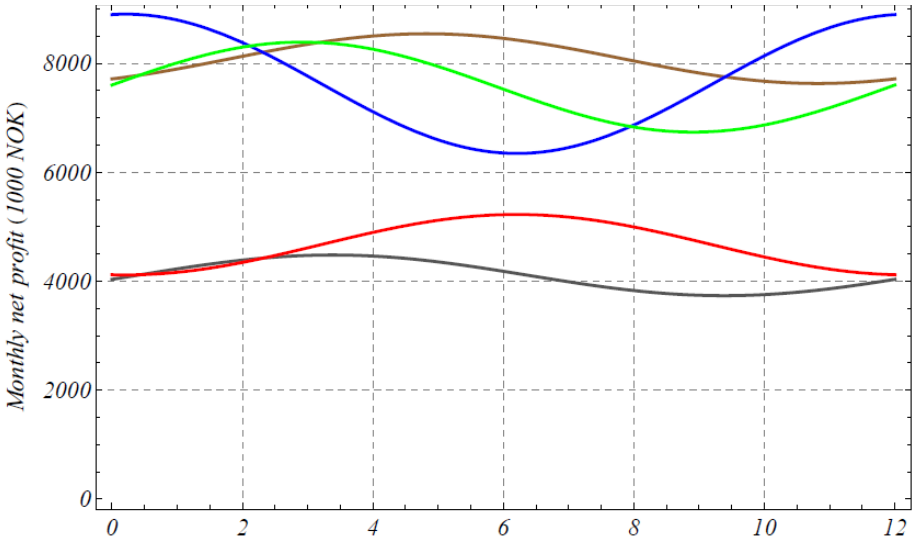

Figure 4 Modeled monthly profit from cod (brown), haddock (blue), saithe (gray), combi (green) and shrimp (red) fisheries

The optimizing routine is utilizing the capacity of constrained optimization built into the Mathematica software. The model's control variable is the type of fishery, searching for local profit maximums of varying sequences of fisheries, assuming none, one or several occurrences of the five possible fisheries. The optimizing routine is constrained by the quotas of cod, haddock and saithe, and takes into account varying bycatch within each fishery over the year.

The results from the optimization are shown in Fig. 5, obtaining a contribution to fixed costs of 43.2 million NOK. The model suggests the vessel should do haddock fisheries in December and January, switch to cod fishing in late January before utilizing shrimp from mid-March to early December.

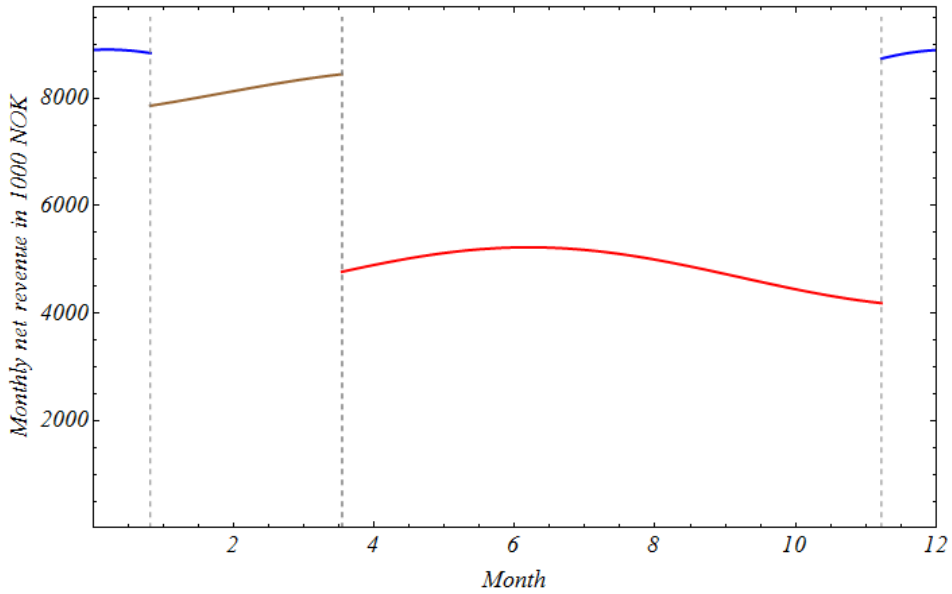

Figure 5 Profit maximizing selection of fisheries and sequence

Table IV compares the vessel's total catch and quota by specie. The cod and haddock quotas are fully utilized, while the saithe quota is marginally exploited with only 194 out of 1.450 tons fished. Based on

the marginal profit curves, this was expected, as the saithe only showed higher profits than shrimp a small period in February. The little saithe that is caught is caught as bycatch in the cod and haddock fisheries.

Table IV Catch, quotas and contribution for the modeled vessel

	Catch	Quota	Profit (1,000 NOK)
Cod	2,000	2,000	14,457
Haddock	1,250	1,250	6,763
Saithe	194	1,450	
Shrimp	2,843	No quota	22,000
Total	6,267		43,220

DISCUSSION

Our model predicts a fishing pattern chronologically composed of a short haddock season, a medium cod season, a long shrimp season and a short haddock season finishing off the year. Although there is large variation between the actual vessels' observed fishing patterns, the predicted pattern differs considerably from the observations. Relatively few vessels undertook long shrimping seasons and few had haddock seasons. Those that did fish haddock generally placed this towards the middle of the year. Cod was usually done in January, as opposed to the modeled February to April. During this time, most of the observed trawlers undertook saithe fisheries, a fishery that is not represented in the modeled pattern.

The model is a simplification of the highly complex decision problems facing actual fishermen, making restrictive assumptions and leaving variables out of the model. A number of factors can have influence on the results and can contribute to explaining the differences, particularly model assumptions and suboptimal decisions by the operators.

The model assumes full information about catch rates. As the observed catch rates showed large variations, this is an obvious shortcoming that is explicitly modeled in other effort allocation studies such as Lane [1] and Babcock and Pickitch [2]. With information about the true catch rates coming from the first tows, a skipper would have new information and could change the decision about where and what to fish. We did not have explicit haul data to calculate catch rates, but approximated this through data from landing forms stating date and landed quantity. This may underestimate trip length and hence catch rates. The landings are often a combination of various fisheries, yielding further uncertainty about catch rates.

The catch rate "data" were regressed to form a seasonal pattern. For some fisheries, the fit was less good, and it is likely that the true seasonal pattern had not been modeled. The model assumes that the fishermen cannot influence the catch composition beyond the selection of the five defined fisheries. The observations on individual landings as illustrated in fig. 6 suggests that the skippers can target a number of catch compositions.

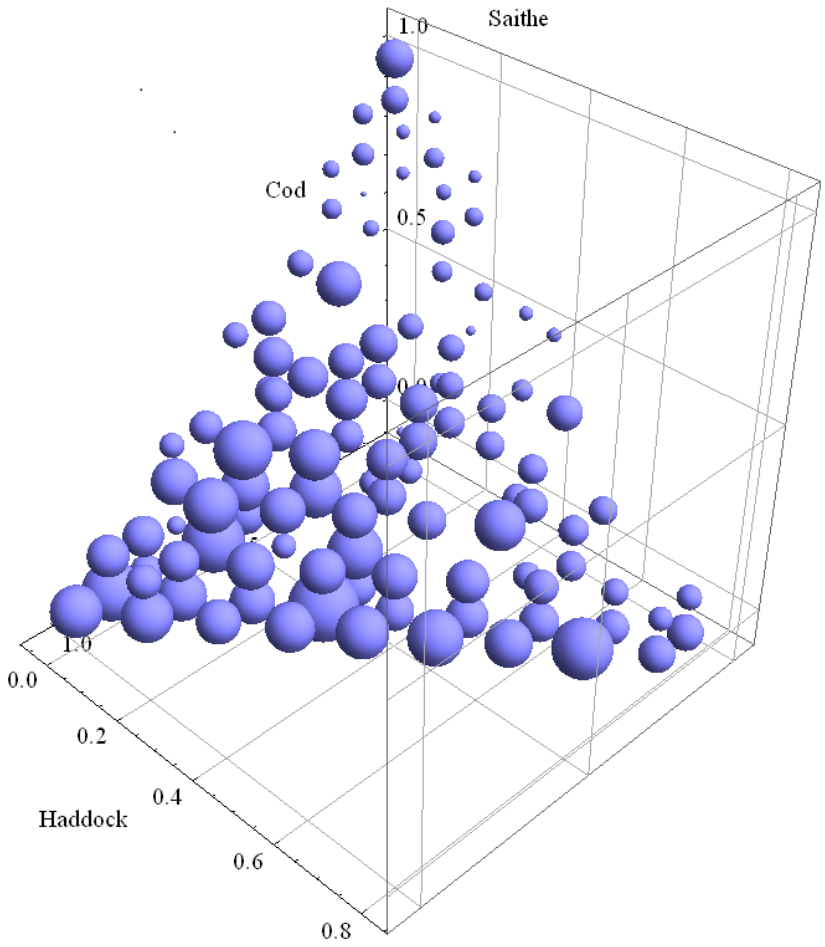

Figure 6 Cod catches (size of bubbles) distributed according to share of cod, haddock and saithe in landings 2011.

Although the uncertainties associated with catch rates are likely the largest, differences among the vessels in technical and organizational characteristics also play a major role. Different size, engine capacity, cargo holds, fish finding and processing equipment can render a vessel unsuited for certain areas or fisheries. As an example many vessels do not have equipment for processing shrimp installed as shrimp prices have recently risen after a long period with low prices and profitability. Some of the vessels are owned by vertically integrated companies and may have a fishing pattern that is influenced by downstream firms [8].A prime difference among vessels is found in their quota portfolio. Some vessels hold higher quotas than others, and this will have a major impact on their harvesting pattern. Higher quota for the model vessel will likely lead to reduced shrimping season and expanded haddock and cod seasons.

The model also implements quite simplified cost function, represented only by fuel, fees and labor costs. The fuel costs may be misrepresented, as we do not have good information on the causal relationship between catch and fuel consumption. Total fuel costs for a year is comparable with observations of fuel costs, but the division between fisheries and catchability is uncertain. With high catchability, the trawler's processing capacity may be limiting, and it may not need to operate the trawl continuously, reducing the fixed element in the cost function.

We may also have disregarded other variable cost elements that may vary with fisheries. The maintenance cost of fishing gear is an example of such an item. If a fishery is taking place on rocky bottom and another on mud, the cost is likely to differ. We have not included any opportunity costs associated with fishing as these vessels have very few alternative uses today.

Spatial aspects are only indirectly included in the model through the data on catch rates. A more detailed modeling of these could influence the results as some fisheries occur further from port than others, thus reducing available fishing time and increasing fuel costs. Supply and demand is also assumed to be as in 2011. If all vessels were following the predicted pattern, it is likely that this would have influence on prices.

Fig. 7 shows other local profit maxima reported by the model. In the first panel, the start of each fishery is done earlier in the year and the second has the cod season later in the year. The third panel replaces the haddock and some of the cod fishery with the combination fishery. The reduction in profits are relatively small for these alternatives, 0.2, 1.1 and 0.5 million NOK, respectively. This implies that the economic loss of selecting the wrong fisheries and sequence is relatively small.

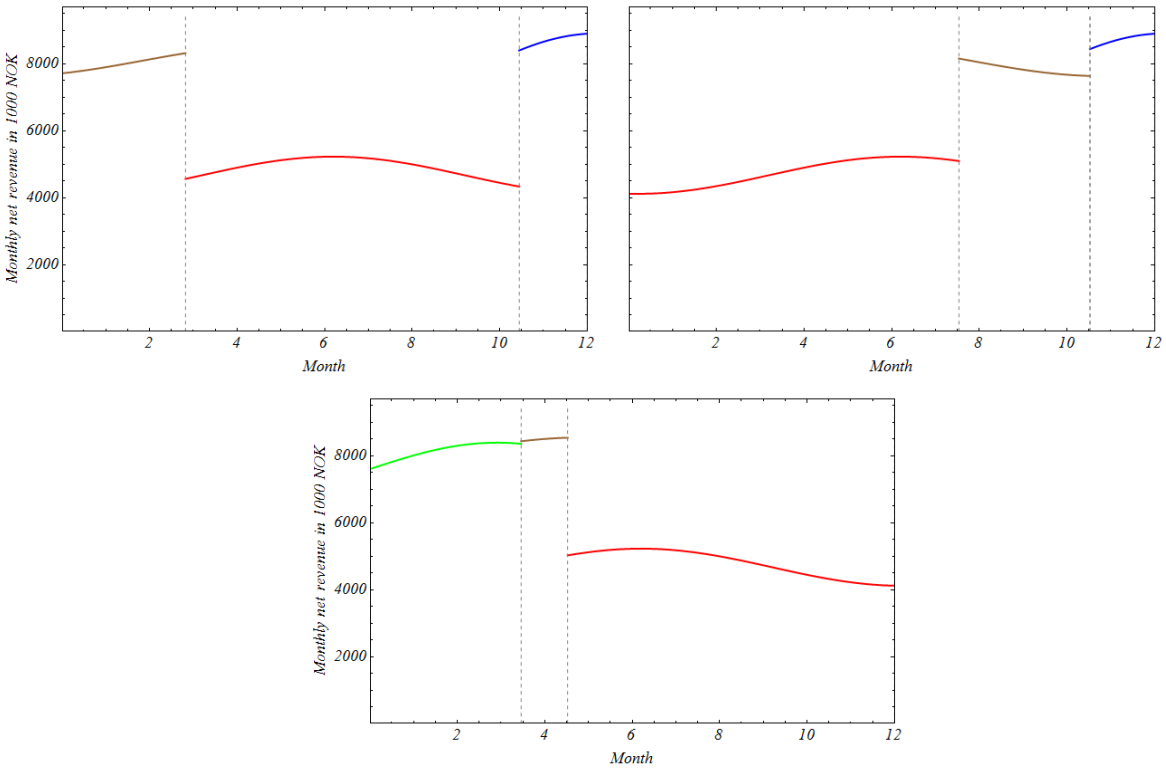

Figure 7 Other local profit maximizing fisheries sequences

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The Competitive Advantage of Nations: Has the Icelandic whitefish fillet industry created and sustained superior performance over the Norwegian industry?

Dato

2014-08-17

Type

Master thesis
Mastergradsoppgave

Forfatter

Bjørgvinsson, David Bragi

Sammendrag

This thesis reveals that the whitefish fillet industry in Iceland is more profitable than the Norwegian whitefish fillet industry. The main reason for this is that the industry in Iceland is structured in a much different way than the Norwegian industry i.e. the firms that constitute the Icelandic whitefish fillet industry can be divided into four different strategic groups. And the more complex the structure of the firms in Iceland are, the more profitable they become. Such structures makes the Icelandic industry more able to pursue differentiated strategies that involves processing and exporting more of fresh whitefish fillets than the Norwegian industry. These strategies are matched by procurement strategies that focus on landing fresh whitefish of higher quality. If it is desirable that the Norwegian industry should become more profitable then they should be allowed to develop into same direction as the Icelandic industry by making the institutional framework less rigid, but that will require managerial, administrative and political grips that is not easy to implement.

Forlag

UiT Norges arktiske universitet
UiT The Arctic University of Norway

Strategivalg i usikre omgivelser : sentrale egenskaper for økt lønnsomhet i norsk filetindustri

Dato

2013-05-15

Type

Master thesis
Mastergradsoppgave

Forfatter

Nilssen, Jon

Sammendrag

Norsk filetindustri av hvitfisk er for mange sett på som en næring i sammenhengende krise. Industrien kjennetegnes av hard konkurranse om knappe ressurser, hvor den største usikkerheten knyttes til råstoffet som i svært liten grad kan kontrolleres og predikeres. I en bransje med så turbulente omgivelser vil bedriftens strategiske valg være avgjørende for om den overlever eller faller fra. I denne oppgaven har fokuset vært rettet mot å vurdere om det finnes bedrifter som har utviklet verdifulle egenskaper tilpasset råstoffusikkerhet. Med utgangspunkt i strategifagets to dominerende teoriretninger har konkurransearenaen blitt analysert, hvor det er konstruert spesifikke variabler for å forklare forskjeller i prestasjon. Funnene viste at det i løpet av en ti års periode var enkelte bedrifter som konsekvent leverte økonomiske resultat over gjennomsnittet for populasjonen. Disse bedriftene sies derfor å ha det litteraturen omtaler som varige konkurransefortrinn. Videre ble en rekke dimensjonert relatert til underleverandører undersøkt. Funnene fra oppgaven indikerer at de beste bedriftene til tross for ulike ressursporteføljer har ervervet seg de samme verdifulle egenskapene. De konkrete egenskapene som er funnet verdifull for norsk filetindustri baserer seg på ferske leveranser fra kystflåten, spesielt fra krokredskap som leverer råstoff av høy kvalitet. Gjennom en slik tilpasning klarer bedriftene å senke kostnadene på råstoff, samt øke produktopsjonene som produseres.

Forlag

University of Tromsø
Universitetet i Tromsø

Food Control

Volume 27, Issue 1, September 2012, Pages 228–233

Catch to landing traceability and the effects of implementation – A case study from the Norwegian white fish sector

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Show less

doi:10.1016/j.foodcont.2012.03.021

Abstract

White fish is an important part of the diet of European consumers. The sources of such white fish range from wild caught to aquaculture. In order to provide consumers with better product information about the fish they purchase, information must be recorded in a retrievable fashion along the supply chain. In this study, current traceability practice on board a freezer trawler was modelled, areas for improvement were identified and the attitudes of employees towards the traceability system on board the trawler were investigated. The trawler was shown to have traceability information registered at a haul level. All information was stored electronically, the majority of changes in state of the fish (transformations) were of the transfer type. Traceability implementation was a positive experience for the employees. The information registered by the trawler needs to be used further down the supply chain.

Highlights

► Current traceability practice on board a freezer trawler was modeled. ► CodTrawl registered traceability information related to each haul. ► Motivations for traceability were market access and better control of production. ► Traceability implementation was seen to be positive what by the employees.

Keywords

Traceability practice; Human factors; Motivation and hindrances in traceability

Fisheries Research

Volume 174, February 2016, Pages 280–287

Management performance indicators based on year-class histories

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doi:10.1016/j.fishres.2015.10.026

Abstract

The stock assessment data provided by ICES's Arctic Fisheries Working Group represents a unique source of insight into the interplay between environmental factors, stock dynamics, fisheries and management decisions. This paper explores how the life history of year-classes constituting the Northeast Arctic cod stock could be used as performance measures for fisheries management. Five biological indicators are suggested for management evaluation, together with time series of environmental variables (ocean temperature and salinity). A brief evaluation of the indicator values indicates successful management of the cod stock, where most of the indicators develop in a positive direction, reflecting a sound stock situation in line with expressed management objectives.

Keywords

NEA cod; Fisheries management; Management indicators

ELEMENTA
Science of the Anthropocene

Causes and consequences of fleet diversity in fisheries: The case of the Norwegian Barents Sea cod fishery

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Abstract

Fisheries operate under fluctuating environmental conditions, targeting fish stocks that appear in varying densities in different areas, often with abrupt and unexpected local changes. Physical conditions, markets and management regulations constrain vessels in different and varying ways. These factors all contribute to forming the fleet diversity we find in most fisheries. Here, a simulation model of the Northeast Arctic cod fishery is used in order to investigate how this diversity is formed and maintained, assuming rational economic behaviour under varying combined constraints. The study also focuses on how the ability of vessels to find fish influences fleet diversity, profitability, stock development and seasonal profiles of the fishery. Results indicate that an increased ability to target the most profitable fishing grounds may influence fleet diversity positively or negatively, depending on overall exploitation level. High exploitation rates also increase the temporal fluctuations in fleet diversity and profits, which are amplified as the fish-finding ability increases.

DOI 10.12952/journal.elementa.000110

ELEMENTA
Science of the Anthropocene

Harvest control rules in modern fisheries management

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Abstract

Harvest control rules have become an important tool in modern fisheries management, and are increasingly adopted to provide continuity in management practices, to deal with uncertainty and ecosystem considerations, and to relieve management decisions from short-term political pressure. We provide the conceptual and institutional background for harvest control rules, a discussion of the structure of fisheries management, and brief introductions to harvest control rules in a selection of present day cases. The cases demonstrate that harvest control rules take different forms in different settings, yet cover only a subset of the full policy space. We conclude with views on harvest control rules in future fisheries management, both in terms of ideal and realistic developments. One major challenge for future fisheries management is closing the gap between ideas and practice.

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05-A-3

Capacity reducing measures in Norway: the case of the cod trawlers

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Excess capacity and overfishing have constituted major threats to sustainable management of fish stocks. Moreover, if capital is locked in unproductive capital in fishing vessels it also constitute a threat to social welfare if fish abundancy and prices are too low to support the livelihood of fish dependent communities and populations.

In this paper we address different stages of Norwegian regulations aiming at reducing the fishing capacity of the fleet. The case studied is the cod trawler fleet: a vessel group that was introduced in the fishery to support fish processing industry in North-Norway. We start with a historic introduction to the development in the Norwegian fishery sector, where the need for capacity reducing measures becomes ever clearer in the second quarter of the last century. Different measures and policies are scrutinized during the period studied, and there seems to be a clear development from subsidies and management dictate to market based incentives in the structural policies.

Although introducing TAC and a fixed share of the quota to the vessel group, the fishing opportunities still fluctuates significantly. In addition, annulling subsidies causes need among the actors for innovation and efficiency. In our study, we find a vast reduction in number of vessels. However, as new and efficient vessels are introduced to the fleet, the capacity is not reduced.

The findings in the paper reveal several challenges related to how to adjust the fishing capacity within the frames of the Norwegian management regime.

09-G-4

Effects of exchange rate fluctuations on performance measures in the Norwegian seafood industry

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The seafood industry in Norway relies on selling most of its production output in a global market. The Norwegian Krone is a vulnerable currency subject to frequent fluctuations, in recent years especially in connection with developments in the crude oil price. The Norwegian seafood industry's competitiveness is sensitive to changes in the exchange rate towards important foreign markets. Large and sudden changes in the currency price level can therefore be challenging for both the industry and its buyers. Exchange rate effects further create methodological difficulties when attempting to understand and analyze changes in firms' profitability, and product-price changes.

The paper analyzes how large exchange rate changes affects key performance measures in the Norwegian seafood industry. Two measures are used, firm profitability and seafood export value. The purpose is to shed light on how exchange rate changes affects the competitiveness of Norwegian seafood firms on a global scale, and to develop a framework for predicting the effects of future periods with extreme currency price fluctuations.

Attention is placed on three main bodies in the Norwegian seafood sector - Whitefish, Pelagic, and Aquaculture. These are analyzed separately.

The analysis focuses on the period from 2000 to 2015, with special attention given to three sub-periods: 2002, 2008/2009, and 2014/2015. All three periods where subject to major exchange rate changes over a relatively short time span, which in hindsight revealed to have had considerable effects on the profitability of Norwegian seafood firms.

10-C-1

Comparing market orientation and success of fresh cod value chains

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The Norwegian seafood industry is often described as a commodity supplier, sometimes struggling to exploit the full value potential of the resource. Being market oriented has been emphasized as an important factor for achieving higher performance and competitive advantage in business. The literature often addresses the importance of firms' market orientation, but seldom includes the value chain's market orientation. We claim that for fresh seafood, and especially wild caught fresh cod, market orientation throughout the value chain is crucial because of: extremely short shelf live, variable and potentially very high supply volumes, distance to market, diverse fleet structure, capture methods and onboard handling systems, weather dependence, fish migration patterns and potentially high costs.

This paper measures the market orientation of two value chains for Norwegian fresh cod in 2015. The actors' satisfaction with the communication throughout the chain was used as the metric. A qualitative, explorative approach using in depth interviews of the actors in the value chain: fishers, processing production managers, company management, exporters, and a selection of importers in France and Germany. The economic performance of Norwegian companies was included in the analysis identify any correlation between market orientation and performance. The results show that the companies with high degree of market orientation are more profitable and have more satisfied customers. These companies consciously gather and disseminate market intelligence, and focus on building long-term relationships. The paper concludes that scope for further performance gains exist through greater incorporation of actors at both endpoints of the value chain.

10-F-2

Local level stakeholder initiative: North Norwegian municipalities' reaction to changes in fisheries management

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The industry owned trawlers land-lock obligation, originally intended to ensure both greater seasonal distribution of raw material as well as settlement in coastal communities, functions poorly and is being put under pressure. This is due to national and global trends in economics and politics, technological change and changing market conditions. Because of this, the industrial trawler concept is torn between its role as a raw material supplier with a social responsibility, and its role as a profitable actor on a competitive global arena. Municipalities have obtained a key role by intervening in what is regarded as a closed system made up by private industry actors, a state administrative apparatus and shifting policy strategies.

In this paper, we examine industry owned trawlers land lock obligations through a theoretical framework including industrial policy analysis and municipal innovation theory. We show how changes in regulations concerning the trawler land-lock obligations have made appeals to the judicial system unsuccessful as an effort to ensure that the catch is landed according to the original intentions. However, innovative measures in individual municipalities has produced local results, mainly in the form of economic compensations for missed raw material landings. This has also led to the proliferation of strategies among municipalities in similar situations. In this way, local authorities may contribute to the removal of a regulatory failure underpinning an outdated industrial concept.

Sporbarhet og bærekraft

Trends in Food Science & Technology

Volume 29, Issue 2, February 2013, Pages 142–150

Viewpoint

How to define traceability

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Available online 24 October 2012

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http://dx.doi.org/10.1016/j.tifs.2012.10.003

While food product traceability has become increasingly important in recent years, there is no consensus on what the term "traceability" means, and several conflicting definitions exist. This paper gives an overview of relevant traceability definitions, outlining similarities, differences, and the consequences of choosing one definition over another. To ascertain which definitions are most commonly used, 101 scientific articles relating to food traceability were reviewed. All the definitions commonly referred to in these articles are shown to have weaknesses. By combining the best parts of the existing definitions, this paper offers a new possible definition of traceability as pertaining to food products.

Highlights

► The term traceability, as pertaining to food products, is not well defined; several conflicting definitions exist. ► In scientific articles, the most frequently used definitions are found in the EU General Food Law and in ISO 8402. ► These definitions do not match the functionality and content of traceability systems as described in many articles. ► In this article an alternative definition of traceability is presented where the most obvious problems have been addressed.

Supply chain expectations for tool to calculate sustainability of white fish products at a batch level

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Abstract in Norwegian:

Matindustrien har de siste årene møtt krav om mer miljøvennlige produkter og effektive måter å kommunisere dette på. Behovet er åpenbart i sjømatindustrien hvor hensyn til miljø, etisk produksjon og økonomisk bærekraft er pådrivere for økt kunnskap om hvordan produkter og bedrifter påvirker bærekraft. Hvordan disse bekymringene og behovene omsettes til krav fra industrien er dårlig beskrevet i litteraturen. Denne studien ser nærmere på hvordan ulike "stakeholders" i verdikjeden kan bruke data om bærekraft i markedsføringstiltak, intern benchmarking og forbedring av miljømessige påvirkning. Hovedutfordringen er å designe et måleverktøy som kan brukes ved forskjellige betingelser og fortsatt opprettholde integriteten.

Abstract in English:

The food production industry has in recent years had to answer calls for environmentally friendly strategies and methods of communicating these effectively. This need is seen clearly in the fisheries sector where the concerns regarding the environment, ethical production and economic sustainability are driving forces for greater knowledge about the sustainability impact of a product or company. How these concerns and needs translate into requirements from the industry is poorly described in the literature. This study investigated these requirements within the framework of a theoretical tool which the stakeholders could use in the future. The results of the research carried out here show that stakeholders, through the fisheries supply chain, wish to use sustainability data for marketing purposes, internal benchmarking and improvement of environmental impact. The main challenge reported is to design a measurement tool that can be used in different conditions whilst still maintaining that integrity.

Introduction

Sustainability is the key to being able to provide food for generations to come. Therefore it is crucial to identify areas for improvement. When assessing sustainability it is important to include information from what has been called the triple bottom line or the three pillars of sustainability, Society, Economy and Environment see Figure 1 (Hunkeler & Rebitzer, 2005; Kloepffer, 2008; Remmen *et al.,* 2007).

Life Cycle Assessment (LCA) is a standardized approach to quantify environmental impacts in relation to a product from a supply chain perspective. A weakness is that LCAs are often resource intensive to undertake, which hampers operational day-to-day use and a drawback often pointed out by the industry is that results of different studies are not fully comparable because of different goals and scopes (Parker, 2012; Vázquez-Rowe, Hospido, Moreira, & Feijoo, 2012). Figure 2 demonstrates how an LCA is applied for a consumer product i.e. inputs and outputs from different stages in a product's lifecycle are considered and given a value.

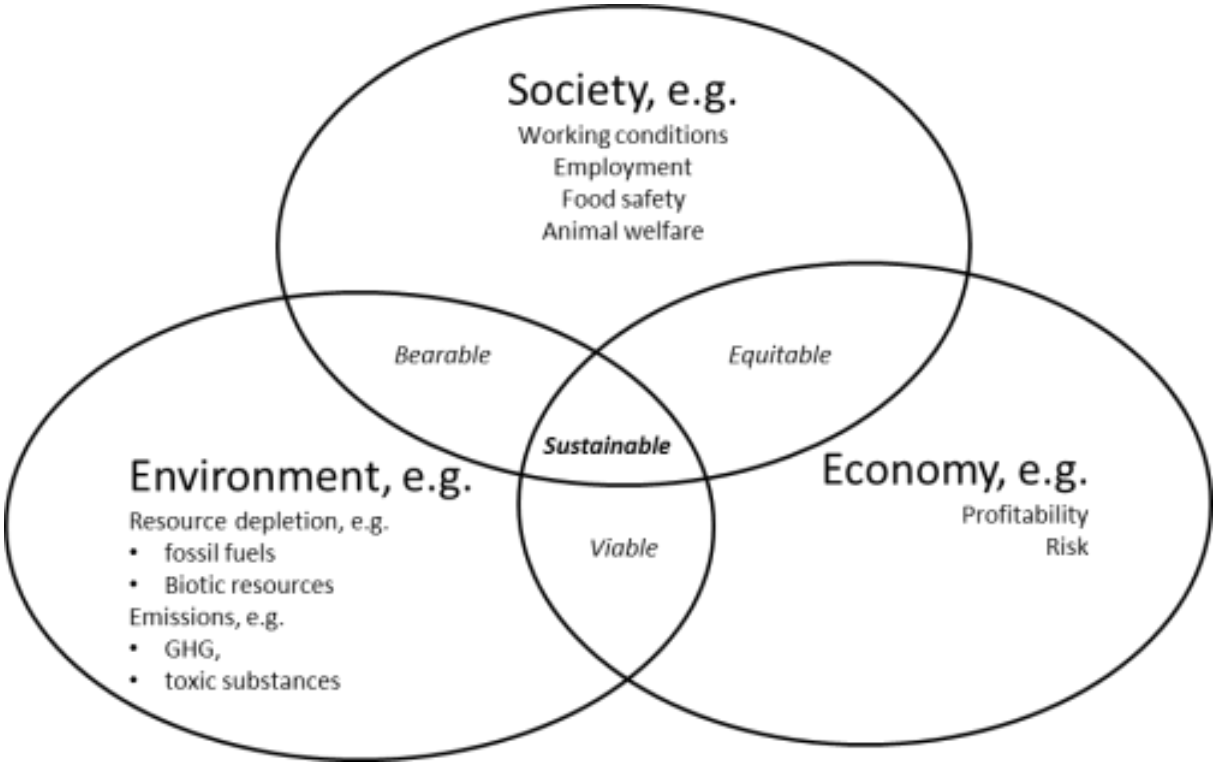

Figure 1 The three pillars of sustainability modified from Hunkeler & Rebitzer (2005), Kloepffer (2008) and Remmen et al.,(2007)

The life cycle of a product implies a chain of successive events. An LCA quantifies the use of resources and emissions to the environment during the life cycle of a product.

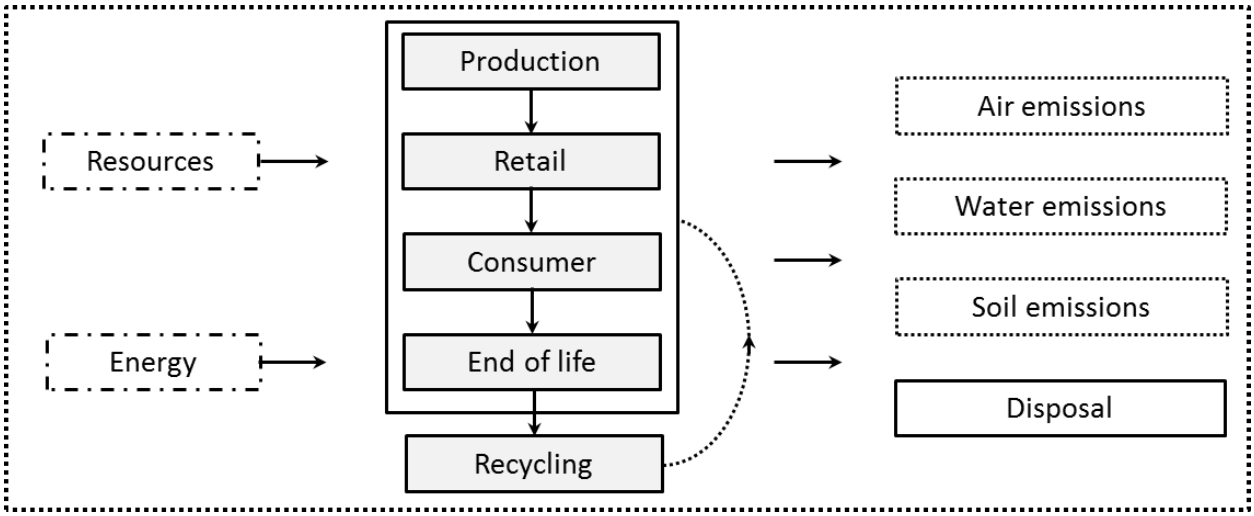

Figure 2 Example of an LCA for a consumer product

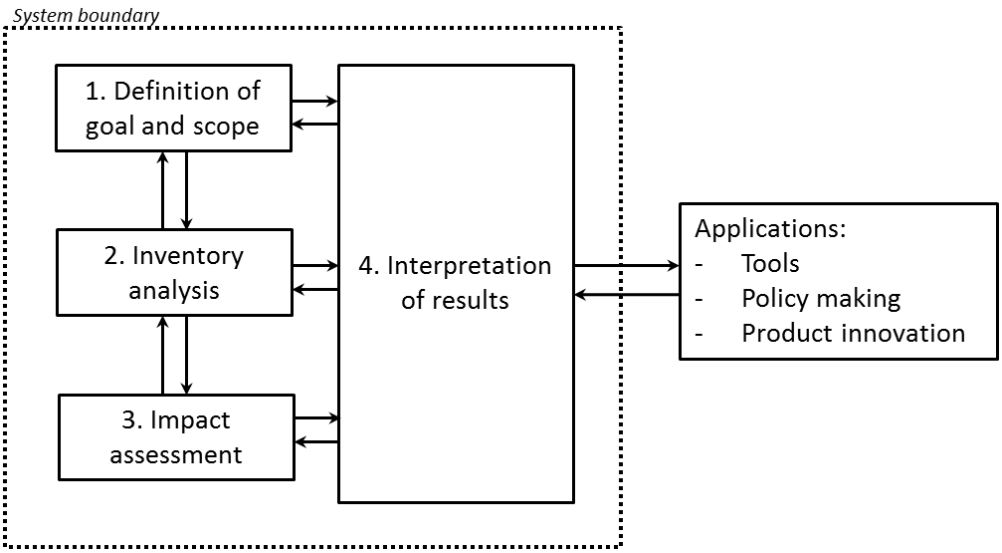

Figure 3 LCA Framework

Currently the LCA framework (fig.3) does not extensively include the social and economic aspects of sustainability. A complete Sustainability Impact (SI) tool should include these factors and aim to give consumers and other supply chain actors a more complete and simple manner in which to judge sustainability.

Calculating SI is of particular interest in the whitefish sector because conditions change through the season and the market is increasingly being influenced by the increasing presence of farmed fish. This incentive means that the sector is motivated and interested in new ways of assessing sustainability impact.

Currently a number of companies have operated with lifecycle analyses (LCA) or studies of the environmental impact of a product or production in general. What is missing is the ability to differentiate between two examples of the same product which may have a varying sustainability impact due to for example different fuel efficiencies during the catch operation. With regards to dish it will vary according to the gear employed and seasonal changes in the availability of the fish.

Currently there exists no simple tool for carrying out sustainability impact on products at a scale smaller than a year nor is there any tool which can be used by multiple entities in the supply chain. Before creating such a tool it is appropriate to find out what those initially using the tool (i.e. stakeholder) are interested and what they expect from it. There is little research, mapping what stakeholders would want in order to be able to assess their own internal sustainability and their attitudes towards this. For example the LCA's described above are often carried out based on data from one or more years and require a great deal of new data for each calculation.

This research aim to outline what the stakeholders in the wild caught fisheries supply chains involved in the case studies expect from measurements of sustainability and how best they could exploit the latest research as part of their business. Stakeholders in the case of this study are small and medium sized enterprises as well trade associations. The stakeholders are expected to consider an SI tool which could be used independently by one company. The tool could of course cover a whole supply chain if all partners in the chain used the tool.

In order to achieve relevant stakeholder orientated solutions for calculating sustainability the stakeholders need to be motivated to use it and it needs to be appropriate

for their needs. Therefore we need to carry out research in this area.

Method/Design

In order to correctly identify what sustainability information is important to stakeholders and how they would expect to use a tool for calculating their sustainability impact in a typical whitefish supply chain, interviews and workshops were carried out. The stakeholders include representatives from all sections of the wild caught fisheries supply chains in northern Europe. The stakeholders were from Iceland, Norway, Sweden and the United Kingdom. These areas were chosen because of their importance and relevance to the fisheries industry across the EU. In addition the stakeholders have connections with processors in countries outside Europe such as China. The types of stakeholder were fishing boats and associations of fishing boat owners, fish processors and environmental certification associations.

Stakeholder workshops were held where the methodologies and possible information that could form the basis of a tool for assessing sustainability impact (SI) were presented. The data collection was carried out using a questionnaire which was completed by a representative of each of the stakeholders and then discussed verbally in order to clarify any uncertainties.

A selection of the questions is found in Table 1 below.

Table 1 The questions used as part of the stakeholder analysis

Q nr.	
1	What do you expect to achieve through the development of the sustainability impact (SI) tool?
2	What do you hope to achieve through the development of the SI tool?
3	What elements to you expect to be important in the SI tool?
4	How should the SI tool be made available?
5	How detailed should the SI tool be? Should it include every possible contributing sustainability factors Should it only include main contributing sustainability factors Should it only include issues where data is easily available Should it be as easy to use as possible
6	Do you have any concerns regarding the SI tool, its development or this project?
7	What type of input are you expecting to give to the SI tool
8	How will be expecting to use the SI tool? (what questions should the SI tool answer for you?)
9	Following on from this – what are your motivations for participating in this project?
10	How important is profiling the environmental impact of your members/company?
11	How important is profiling the economic impact of your members/company?
12	How important is profiling the social impact of your members/company?
13	What internal impacts do you expect greater awareness of?
14	How important would the SI tool be to your members/company?
15	Do you think you will use the results of the SI tool in marketing your products?
16	How do you hope to be able to use the SI tool?

In addition to answer the questions each of the stakeholders were encouraged to discuss opinions expressed.

Findings

The stakeholder responses showed that despite the fact that they were gathered from very varied backgrounds, for example certifying organizations and fishing boats, they had many similar opinions about what should be included in a tool to assess SI, what they would expect to be included and the possible limitations.

The findings presented here are not those shared by all stakeholders but rather an overview of the broad spectrum of responses. Where an opinion was held by the majority of the stakeholders this is clearly stated in the findings.

The stakeholders expected to achieve several related goals through the use of a tool for calculating SI. These revolved around documenting the environmental aspects of their products both with regards to provision of information for customers and that of documentation internally within a supply chain. They also expressed the desire to be able to use this as a marketing tool and as a tool for "enhancing (improving) the environmental load of their products" and improving the environmental impact of individual companies.

Through the development of a SI tool the stakeholders hope to gain a better understanding of factors contributing to the environmental impacts of their products. The stakeholders also expressed the desire to understand how actors in the supply chain can affect the environmental burden of their products. In addition the stakeholders would like to be able to quantify the environmental impact.

When the stakeholders were questioned as to what answers the SI tool should supply, one of the dominant responses was that of analysis and calculation of the environmental impact of their current practices. Stakeholders wanted to be able to supply answers to questions regarding sustainability both within supply chains and to end consumers, for example in decision making processes when choosing raw materials. This is in agreement with previous findings about the expected uses of sustainability certification (Gulbrandsen, 2005). Some of the stakeholders would like the tool's specifications to be applicable in certification settings and other formalized uses. Certain stakeholders expressed the idea that the tool should also clarify the social and economic impacts of sustainability as well as the environmental impacts.

It was clear from the answers to all the questions that an SI tool would be important in a marketing context. Some of the stakeholders believe that the different parts of the supply chain or for example different sizes of boats will use the SI calculation differently. The SI tool could be used to establish industry benchmarks and could be offered as a service within the trade associations as internal web services in addition to external web services. The stakeholders also highlighted the possibility of using the tool to encourage suppliers to improve their environmental performance.

The interviewes repsonses with regards to which elements should be included in the tool where varying and not extensive the collective response is listed below:

- Fuel usage
- Emissions
- Type of gear
- Kg fuel usage/kg fish
- Packaging material
- Different types of transport, e.g. sea or land

The stakeholders also expressed the desire for the calculation method to be universal. The Sustainability Impact (SI) calculations must be seen as fair and comparable by the potential buyers. These expectations of the relevant elements to be included are realistic and in line with current LCA practice, however they are only a small number of the total number of elements currently included in an LCA (Vázquez-

Rowe *et al.,* 2012). This illustrates the stakeholders' desire for a way of calculating SI impact in a simple fashion. The stakeholders had different perspectives with regards to how the tool should be made available dependent upon their position in the supply chain. There was an expectation that the tool should be easily implemented, easily used and automated. There was an expectation that it could be used as an online tool and as an extension of existing services. The tool should be based on a methodology that provides confidence in the validity of the data created.

With regards to the level of detail expected in the calculations and the tool the stakeholders thought that it should be focused on being at a batch level, which is a smaller division for data acquisition then is currently seen in LCA's. Beyond this the stakeholders expected the tool to focus on the major contributory factors to their environmental impact. The stakeholders emphasized ease of use as being important. The desire to input only the minimal amount of new data for each new batch was also important. Other values that maybe constant from batch to batch should be able to be pre-implemented and "remembered" by the tool. The level of detail should be sufficient to provide credibility but not so complex that mistakes could occur when inputting data into the tool.

The stakeholders expressed a number of concerns regarding both the calculation and publication of the results of such an SI assessment, one of the major concerns being the possibility that it could be used for propaganda by competitors or advocacy groups. Another concern was that of data security, i.e. where data input into the tool may be used and by whom. Concerns were also raised about the acceptability of the outputs from the tool in a wider context, ease of implementation and suitability for a wide variety of companies. There is a fear that the tool will only be able to be used internally within a company when it is most interesting for external purposes. Finally concerns were raised with regards to the "usability" of the tool and the possible need for a further project in order to create a tool which can be used in marketing and not just for internal bench marking.

When questioned about the motivations for taking part in this research (the same motivations as found in uses were identified with the additions of the ability to limit costs related to achieving a desirable environmental impact and the ability to illustrate this for the market.

The stakeholders generally responded that with regards to the three areas of sustainability they were most interested in profiling the environmental sustainability followed by the economic sustainability with social impact being least important. They felt that a tool for assessing sustainability at a batch level would only be widely accepted if it is widely used and its potential to create value will be based on its user friendliness and general supply chain perspective.

Conclusions

The results of the investigation into the important aspects from a stakeholder's point of view with regards to creating assessment of SI impact can be summarized as follows;

- Calculating and reporting environmental impact
- Marketing (internally and externally)
- Communication both within supply chain and to final customers

The stakeholders expect the development of a tool for calculating SI will assist them in assessing their internal supply chains and also comparing their products (with other companies) with regards to environmental impact. The stakeholders expressed the greatest interest in environmental sustainability followed by economic and social sustainability. It is unclear whether this is related to their current perception of what is included in "sustainability" or a real desire

to focus only upon the environmental aspects. Further work should examine more clearly what is relevant in which context.

With regards to a classical LCA and environmental impact with regards to CO2 emissions fuel usage is the largest contributory factor (Avadí & Fréon, 2013; Tyedmers, 2001; Tyedmers *et al.*, 2005) suggesting that this impact has been clearly identified by all stakeholders (additionally many of the other elements in the list created as part of this work will contribute towards fuel usage). This points to the fact that an adaptation of classical LCA will be an important contribution from a stakeholder perspective. A tool for calculating sustainability impact at a batch level should be,

- Easy to use in terms of input of data,
- Easy to interpret
- Available through web applications
- Offer customization options.
- Detailed enough to be reliable
- General scientific acceptance is desirable.

In futures studies a greater number of stakeholders could be included and end consumers` opinions could be included to give a more complete picture of the most relevant information to be presented.

The stakeholder response indicates an eagerness to not only obtain but also analyse and use information about sustainability impact. Stakeholders highlight the desire not only to use this information as a marketing tool highlighting current practices, but also for internal and supply chain benchmarking. Improvement of internal practices is also a priority. Creating a tool that can fulfill all these needs will be challenging but this research provides a baseline for the creation of a requirement specification for the first generation of such a tool.

This study provides the knowledge of what a tool for internal and supply chain measurements of SI should provide what limitations it may have and who stakeholders from different parts of the white fish supply chain expect to interact with it. The tool should be developed so that it can stand alone in an individual company or be used as part of a supply chain approach. This research has been carried out as part of the WhiteFish project which is a Seventh Framework EU project that will develop a simplified tool for assessing the broad sustainability of North East Atlantic cod and haddock fisheries, based on LCA methodology.

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Marine Policy

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Eco-labeling of seafood: Does it affect the harvesting patterns of Norwegian fishermen?

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Abstract

The aim of this paper is to compare the criteria for eco-labeling of wild-caught fish in the Norwegian eco-certified fisheries, and to study if these eco-labels affect the harvesting patterns of Norwegian fishermen. The eco-labels Marine Stewardship Council (MSC), KRAV and Friend of the Sea (FOS) as applied in 2009 were studied. In this study, the harvesting patterns are defined by using the following parameters: season, catch area, size of fishing vessel, gear type, bycatch, location of landing site and distance to the fishing ground. KRAV had more specific criteria than did MSC and FOS in specific fisheries regarding time of the fishing effort, catch area, size of fishing vessels, gear type (e.g. hook size, and the use of beam trawlers was not permitted) and distance to the fishing ground. The findings show that few of the eco-label requirements influenced these aspects in Norwegian fisheries.

Highlights

► The eco-labels Marine Stewardship Council (MSC), KRAV and Friend of the Sea (FOS) were studied. ► Few of the criteria affected the harvesting patterns of Norwegian fishermen in 2009. ► Energy consumption and problems related to bycatch of coastal cod may change the situation.

Keywords

Capture fisheries; Harvesting pattern; Eco-label; MSC; KRAV; Friend of the Sea

Marine Policy

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Evaluation framework for regulatory requirements related to data recording and traceability designed to prevent illegal, unreported and unregulated fishing

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Abstract

In 2001 FAO published the "International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing". Based on this plan, national and supranational authorities have developed legislation to fight the so called IUU fishing. A key aspect of the legislation proposed so far is the mandatory recording of some data elements and the requirement that these data should be available for access through a traceability system. This article outlines a general framework for evaluation of these types of requirements, using a predictor-outcome N-way matrix. A "good practise" system is described, against which the existing systems and practises can be evaluated. The framework can be used to assess if the regulatory requirements ensure that the relevant IUU fishing identification data are made available, and it can also be used to evaluate the requirements imposed on the traceability system.

Keywords

Illegal, unreported and unregulated (IUU) fishing; Traceability; Data recording; Chain of custody; EU IUU Regulation; EU Control Regulation

Food Control

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Review

Literature review: Does a common theoretical framework to implement food traceability exist?

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Abstract

The purpose of this study was to identify whether a common theoretical framework with respect to implementation of food traceability exists. The literature review showed that no common understanding of the definitions and principles of traceability exists, nor is there a sound common theoretical framework with respect to implementation of food traceability. When no common theoretical framework exists, this affects the implementation process of traceability in the food industry. With a common theoretical framework, all traceability studies could have been more similar, and the implementation processes could have been more goal-oriented and efficient. Based on the review, it is clear that traceability is an interdisciplinary research field, and it spans the natural sciences as well as the social sciences. Further theoretical developments on implementation of food traceability are needed.

Highlights

► No common understanding of the definitions and principles of traceability exists. ► No common theoretical framework exists with respect to implementation of food traceability. ► This affects the implementation process of traceability in the food industry. ► With a common theoretical framework, the implementation processes could have been more goal-oriented and efficient. ► Further theoretical developments on implementation of food traceability are needed.

Keywords

Traceability; Theoretical framework; Implementation; Interdisciplinary research field; Food

Marine Policy

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Stubborn fuel tax concessions: The case of fisheries in Norway

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http://dx.doi.org/10.1016/j.marpol.2014.10.028

Highlights

- Norwegian fisheries subsidies peaked in 1980 amounting to about one third of the landed fish value.
- 2014 Subsidies are nil, excluding management, enforcement and research, and fuel tax concessions.
- The value of fuel tax concessions in 2011 is about one billion NOK, 6.3 per cent of the landed value.
- International fuel tax or CO_2 quota agreements may be necessary for environmental friendly fisheries.

Abstract

In the context of the abolition of traditional subsidies, this paper discusses the persistence of the major remaining subsidy scheme in Norwegian fisheries: exemption from fuel taxes. This reimbursement scheme stems from the late 1980s, and has persisted since then under different governments. This paper gives the background to this support against theoretical predictions of the subsidy's effects on fishing behaviour and profitability. For 2011, the estimated exempted fuel taxes for the fishing fleet was NOK 999.0 million, amounting to 6.3 per cent of the landed value, against NOK 772.7 million (6.4 per cent of landed value) in 2007. The Norwegian scheme is also discussed in relation to similar arrangements in other countries. The national fishing fleet is heterogeneous with respect to oil consumption in transport and fishing operations. Hence, the effect of the fuel subsidy is different for different fleet components. The implications of abolishing this subsidy for the fishing fleet in general and for different vessel groups, as well as its policy implications, are discussed.

Keywords

Subsidies; Fisheries; Environmental taxes; Fuel taxes; Tax concessions

The wider uses of traceability information

4 July 2012 • Author(s): Kathryn A-M Donnelly, Nofima – Norwegian Institute of Food, Fisheries and Aquaculture Research

Although traceability is often associated with food safety, increasingly the tools provided by a traceability system are being used for much more than food safety. The research carried out into traceability, initially spurred on by concerns over food safety, has expanded to include a wide range of different aspects of the modern food supply chain. These include internal logistics, supply chain logistics, food security, food authenticity, efficiency and sustainability monitoring.

For many countries, international trade in fisheries products is very important, and having an effective traceability system is often a required part of food safety systems. However, it must be remembered that simply being traceable does not equal food safety per se. Traceability is also increasingly important for reporting, moderating and refining sustainability strategies in the wild caught fisheries sector. Sustainability monitoring is of ever increasing importance and draws heavily upon traceability and other related and unrelated fields of science. The sustainability of food supplies for global usage in the fisheries supply chain is an area gaining focus.

The importance of this is reflected in the increasing research attention being paid to the area in national and international research initiatives.

Related food topics

- Fish Processing
- Food Safety
- Kathryn Anne-Marie Donnelly
- Norwegian Institute of Food
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Food Control

Volume 27, Issue 1, September 2012, Pages 228–233

Catch to landing traceability and the effects of implementation – A case study from the Norwegian white fish sector

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Abstract

White fish is an important part of the diet of European consumers. The sources of such white fish range from wild caught to aquaculture. In order to provide consumers with better product information about the fish they purchase, information must be recorded in a retrievable fashion along the supply chain. In this study, current traceability practice on board a freezer trawler was modelled, areas for improvement were identified and the attitudes of employees towards the traceability system on board the trawler were investigated. The trawler was shown to have traceability information registered at a haul level. All information was stored electronically, the majority of changes in state of the fish (transformations) were of the transfer type. Traceability implementation was a positive experience for the employees. The information registered by the trawler needs to be used further down the supply chain.

Highlights

► Current traceability practice on board a freezer trawler was modeled. ► CodTrawl registered traceability information related to each haul. ► Motivations for traceability were market access and better control of production. ► Traceability implementation was seen to be positive what by the employees.

Keywords

Traceability practice; Human factors; Motivation and hindrances in traceability

A simulated recall study in five major food sectors

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Abstract

Purpose – This study aims to investigate the effectiveness of current traceability systems in five food sectors: dairy, fish, red meat, fruit and vegetable, and grain. Products were bought within Norway, with national and international origins.

Design/methodology/approach – The method used structured interviews and questionnaires at each link in the production and supply chain of 30 products in order to discover the ability to identify the origin of product, the size of batches used during production, the potential product and process information available and the estimated time of recall in an emergency situation.

Findings – The results showed that it was possible to trace 53 percent of the products bought through their supply chains to their origin. The results demonstrated that mixing transformations create challenges for traceability that are more severe than other types of transformations. Company motivation is an important factor in creating the conditions for a successful tracing event.

Social implications – The study presents findings that can be used by the food producing industry and regulators that will aid in improving the ability to track and trace food effectively. This will aid the food producing industry in providing society with better food information so that consumers can make informed choices.

Originality/value – This study presents data on multi sector traceability, which is not only valuable because of its uniqueness, but also because of the possibility to use this in future studies for comparison and measurement of progress. This study is highly valuable to food producing industries, regulators and researchers as it presents new and unique data, regarding recall times and sector specific challenges.

Keywords Simulated recall, Tracking, Tracing, Traceability, Product recall, Food, Food products, Norway

Paper type Research paper

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Journal of Food Engineering

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Granularity and its role in implementation of seafood traceability

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Abstract

In this study, granularity and its importance for traceability in seafood supply chains is studied. Granularity describes different levels of traceable units. The findings from this study show that granularity plays a key role in the implementation of seafood traceability. Implementation of a coarse granularity level is easier and cheaper than a fine granularity level, but the benefits are also lower. Fine granularity level will increase the complexity of the traceability system, and will give higher costs. A complex traceability system can affect the practical solutions and specification of the information technology systems when implementing traceability. The key is to find the preferable granularity level where the benefits exceed the costs. Consequently, the costs and potential benefits associated with implementing traceability at different granularity levels should be identified.

Highlights

► Granularity plays a key role in the implementation of seafood traceability. ► The chosen granularity level will determine the complexity of the traceability system. ► The key is to identify preferable granularity level. ► All traceability systems should be designed based on the needs of its users.

Keywords

Traceability; Granularity; Implementation; Critical criteria; Traceable information; Seafood

The International Journal of Life Cycle Assessment
pp 1–11

Assessing broad life cycle impacts of daily onboard decision-making, annual strategic planning, and fisheries management in a northeast Atlantic trawl fishery

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Abstract

Purpose

Capture fisheries are the only industrial-scale harvesting of a wild resource for food. Temporal variability in environmental performance of fisheries has only recently begun to be explored, but only between years, not within a year. Our aim was to better understand the causes of temporal variability within and between years and to identify improvement options through management at a company level and in fisheries management.

Methods

We analyzed the variability in broad environmental impacts of a demersal freeze trawler targeting cod, haddock, saithe, and shrimp, mainly in the Norwegian Sea and in the Barents Sea. The analysis was based on daily data for fishing activities between 2011 and 2014 and the functional unit was a kilo of landing from one fishing trip. We used biological indicators in a novel hierarchic approach, depending on data availability, to quantify biotic impacts. Landings were categorized as target (having defined target reference points) or bycatch species (classified as threatened or as data-limited). Indicators for target and bycatch impacts were quantified for each fishing trip, as was the seafloor area swept.

PERSISTENT SUBSIDIES IN FISHING: HOW WILL A FUEL PRICE INCREASE AFFECT FLEET BEHAVIOUR AND PERFORMANCE?

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ABSTRACT

This paper discusses the persistency of one of today's major subsidy schemes in Norwegian fisheries: exemption from fuel taxes in the fishing fleet. The reimbursement scheme stems from the late 1980s, and has been persistent since, under different governments. Here we provide the background for this support and discuss it's persistency against theoretical predictions on subsidies' effect on fishing behaviour. Also, we compare the Norwegian scheme against similar arrangements in neighbouring countries, in a comparable fashion. The Norwegian fishing fleet is heterogeneous with respect to oil consumption in transport and fishing operations. Hence, the effect of the fuel subsidies is different along different fleet components. The analysis compares the impact of an annulment of this scheme on two fleet groups, based on a sensitivity analysis. Finally we discuss the implications of abolishing this subsidy for the fishing fleet in general, different vessel groups and potential policy implications in the wake of such environmentally friendly action.

INTRODUCTION

Subsidies to the world's fishing industry have been under scholars' scrutiny for decades. The reason is obvious: With more effort being directed towards capture activities the evidence and understanding that fish resources are limited and even threatened with extinction have become widespread. In many cases, subsidies have added to overcapacity and overfishing. The magnitude of subsidies within fisheries has been mapped and analysed on global (Milazzo, 1998; Sumaila *et al.*, 2010) regional (Wallis & Flaaten, 2000) as well as on national level (Isaksen & Flaaten, 1998; Isaksen, 2000; Hermansen & Flaaten, 2004; Hermansen, 2009). Also, the effects of fisheries subsidies on fishing pressure, fish resources and trade have been under scrutiny (Porter, 1998; Sumaila *et al.,* 2008), while others focused on the definition of fishery subsidies and categorization of subsidy types (Wallis & Flaaten, 2000; Porter, 2002; Shrank, 2003).

Open access common pool fisheries will usually lead to economic overcapacity and even biological over-exploitation of fish resources. Revenue enhancing and cost reducing support contribute even further to this waste (Brochmann, 1981[i]; Hannesson, 1991; Porter, 2003). When dividing different fisheries subsidies into categories, the classification can take many forms. While Sumaila *et al.* (2010) utilize, "good", "bad" and "ugly" subsidies – depending on their potential effect on the sustainability of the fishery resource, Porter (2003:31-33) synthesizes fisheries subsidies into the following categories:

1. Fisheries management services
2. Subsidies to capital costs, including infrastructure
3. Decommissioning and licence retirement
4. Subsidies to incomes
5. Subsidies for access to foreign fisheries

Within these categories, fuel subsidies or other subsidies that makes intermediate inputs cheaper have no place. Sumaila *et al.* (2010) estimated world-wide fisheries subsidies in 2003 to be in the range of US$ 25–29 billion, where fuel subsidies compose about 15–30 per cent; whereas capacity enhancing subsidies compose the lion's share, about 60 per cent. Fuel subsidies and tax preferences make fishing operations cheaper and encourage vessel owners to invest in stronger, more fuel intensive engines – which allow a greater range of operation and larger catches (Porter 2002).

Norway has a long history of providing assistance to the fishing industry. As put forward by Milazzo (1998: 23): *"Norway has provided financial assistance to its fishing industry for more than 30 years. Since 1964, the government has negotiated annually an assistance package with the Norwegian Fishermen's Association, with the overall objective of raising average fishermen's incomes to level of industrial workers. Not surprisingly, though, these agreements on financial assistance soon lost sight of their original, short-term objectives, and effectively became ongoing subsidies that industry came to expect each year as a matter of course."* Total transfers to the Norwegian fishing industry added up to a considerable share of catch value, peaking in 1981 with more than 30 per cent. However, from 1990, fisheries subsidies were to a large degree phased out, and fell from a 20 per cent share of catch value to less than five per cent within a four year period (Flaaten & Isaksen, 1998). Hannesson (1996: 22-3) shows anecdotally how the subsidization of the fishing industry in Norway was highly correlated with the price of crude oil in the period from 1974 to 1994.

In 2004 the Government stopped the annual negotiations with the Fishermen's Association on financial support. Since then, support to the fishing industry has been modest. Figure 1 (a) shows the peak in fisheries subsidies, as defined by the authorities, in the early 1980s and the rapid decline since then. From Figure 1 (b) we see that the fall in subsidies coincides with a rapid increase in catch per fisherman, as both number of fishermen and fishing vessels are drastically reduced. Figure 1 (a), however, do not include the subsidy element we are interested in – the fuel tax reimbursement scheme, since Norwegian authorities take a more cautious definition of subsidies than the WTO "Subsidies and Countervailing Measures" agreement.

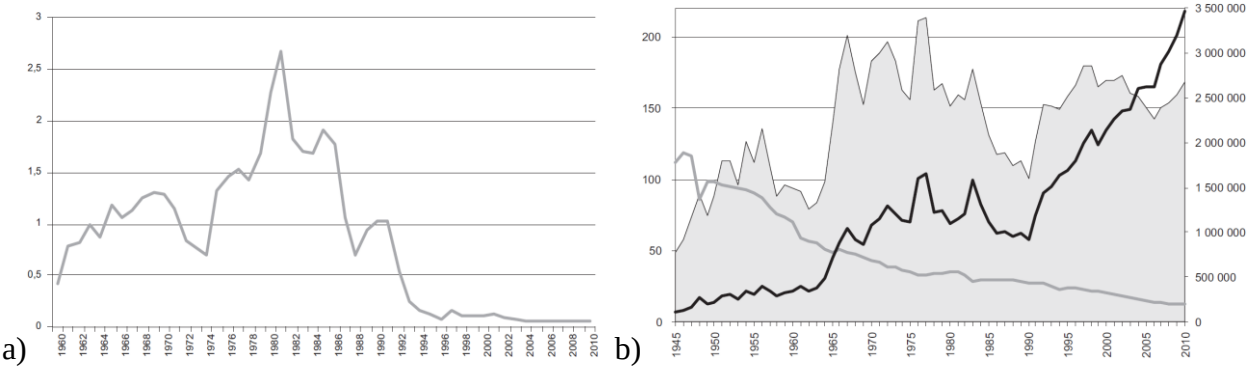

Figure 1. a) Subsidies to the Norwegian fishing industry, 1960–2010 (bill NOK, nominal value) b) catch (right axis), fishermen and catch per fisherman (left axis – all in tons) 1945–2010. Source: Directorate of Fisheries

In the WTO framework (WTO, 2009), financial contributions not only include direct transfer of funds, but also revenue forgone by the authorities, provision of goods or services and purchase of goods. According to the WTO, subsidies are further divided in two categories; prohibited and actionable. Export subsidies and subsidies favouring local content are prohibited. Using the WTO-definition of subsidies, the Norwegian fishing industry is directly supported by mNOK 72, while general services and tax exemptions add up to bNOK 2.21 in 2008. The main *direct support* items are transportation support (49 per cent) and support to the seal harvest (16 per cent). Of the *indirect support items*, the coast guard (22 per cent), income and CO_2-tax exemption (both 16 per cent) and research support (14 per cent) takes the lion's share. In the next section we'll take a closer look at the fuel tax exemption scheme.

We focus on the Norwegian fuel subsidies – the exemption of fuel taxes for fishing vessels – a scheme which has been in effect since 1988. Our research problem is four-folded: First, we describe the Norwegian mineral oil tax reimbursement scheme and its history and place it within the classification scheme of fisheries subsidies. Second, we portray this specific industry support with respect to the industry development. Third, we analyse the effect of a possible annulment of this support, and, finally, we discuss and conclude our findings with respect to industry impact and policy implication.

The paper is organized as follows. The next section provides the background for our analysis. Then we account for the mineral oil taxation scheme and data, before discussing the method and results. Finally, we discuss our findings and their implication for the industry and policy makers.

NORWEGIAN FUEL TAX EXEMPTIONS AND DATA

From 1970, Norwegian enterprises and consumers were taxed for their use of fuel oil, primarily to reduce environmentally harmful emissions. However, from the start registered fishing vessels were exempted from the most important fuel taxes. This is the case also for some other industries. The taxation scheme has been modified and presently purchase of fuel is levied with CO_2, SO_2 and NO_x taxes. In 2008, the CO_2 tax rate was 1.395 NOK/litre. The SO_2 tax is progressive and charges 0.072 NOK/l for each commenced 0.25 per cent sulphur in the fuel (weight basis). NO_X is taxed based on calculated emissions; the rate in 2008 being 15.39 NOK/kg NO_X.

To some degree fisheries are exempted from these taxes. In terms of the CO_2 tax, all fisheries are exempted, while only distant water fisheries (further than 250 nautical miles from the coast) are exempted from the SO_2 tax[ii]. In practice, vessels buy taxed fuel and are reimbursed the CO_2 tax from a government agency. When heading for distant water fisheries, vessels purchase untaxed fuel directly. The most complicated regime is found for the NO_X tax. Fishing vessels with less than 750 kW engine power are totally exempted. An agreement on reduction of emissions was signed by the authorities and several industry organizations. Instead of paying the full tax rate, vessels (both fishing vessels and others) that entered into this agreement pay a reduced rate of 4.0 NOK/kg NO_X. Tax revenues go to a fund that financially supports investments in emission reducing measures aboard vessels.

Detailed data for individual vessels were obtained from The Guarantee Fund for Fishermen (GfF), which has administered the reimbursement scheme since its introduction. In a special data set, we had information for every vessel that were granted fuel tax reimbursement in the period 2000–2007, from which aggregated annual figures over reimbursed volume and value could be estimated. In addition, we were granted access to the data behind the annual profitability study for the fishing fleet from the Directorate of Fisheries (Anon. 2008). From there, cost- and income data, together with catch and operational data, could be obtained for individual vessels, as well as average values for vessel groups. This source, however, represents only a sample of vessels and not the whole population where the selection criterion is mainly the importance of the vessel with respect to first hand sales value. From a total of 1 709 whole year operated vessels, data for 624 vessels were collected and compared (37 per cent). For some vessel groups, with rather low catch value, the sample size's share of the population is rather small (for example for coastal vessels less than 10 meters it was only 16 per cent), while for larger vessels it is usually in the range of 60–95 per cent. The main reason for the differences in relative sample size is that the number of vessels in the sub-population is significantly higher for the former than the latter.

RESULTS

In estimating the value of the total mineral oil tax exemption for the fishing fleet in 2007, shown in Table 1, we have employed a static model, thus not taking into account substitution effects and other adaptations the fishing fleet could have introduced as responses to higher taxes. Official Norwegian statistics on fuel use across industries are not reliable since 2005 (Isaksen and Hermansen, 2009). This study is based on average fuel costs and average fuel prices, and by utilizing the annual profitability survey of Norwegian fishing vessels (Directorate of Fisheries, 2008), the estimate of the actual fuel consumption of the Norwegian fishing fleet in 2007 is 362 million litres. Of this, 244 million litres (2/3) fall in under, and is accounted for, in the reimbursement scheme, while the rest, 118 mill litres, is the estimated consumption of Norwegian vessels operating in distant waters – from "tax free" bunkering in Norway, at sea in international waters or abroad (Isaksen and Hermansen, 2009).

An estimate of the foregone CO_2 tax is obtained by multiplying consumption with tax rate. In 2007, GfF reimbursed fish vessel owners a total of mNOK 236 of CO_2-tax. The rest stems from fuel consumption exempted from CO_2 taxation. To estimate foregone SO_2 tax is more complicated, as the coastal fisheries pay this tax, but data on consumption in distant water fisheries' are not available. Therefore the latter is estimated from data on reimbursed amount, assuming all other use is in distant waters. We also assume that all fuel contains less than 0.25 % sulphur, since heavy fuels rarely are used in the fishing fleet. The exempted NO_X tax in 2007 is estimated to mNOK 327 using a rate of 0.9 NOK per litre fuel.

Table 1. Estimated exempted mineral oil taxes in the Norwegian fishing fleet, 2007.

Tax	CO_2	SO_2	NO_X	Total
Value (mNOK)	352	8	327	687

From an economic (and environmental) point of view, the optimal emission tax on CO_2 should be equal across countries and sectors since the marginal damage is independent of the location of the emission source (Bye & Bruvoll 2008). From the "polluter pay" principle either taxes or emission rights should be utilised. However, CO_2 taxes vary between countries, as well as within national economic sectors and across fuel types (op. cit). The same applies to SO_2, NO_x and other environmental taxes.

When considering the subsidy element of the CO_2-tax reimbursement/exemption the contribution should be determined on market prices (see a recent WTO ruling; WTO, 2009??). In the EU quota market for CO_2 emissions, the price per ton varied between 124 and 235 NOK (€ 13.55–29.40) in 2008 (Isaksen and Hermansen, 2009). The tax in Norway in 2008 (NOK 1,395 per litre oil) corresponds to a rate of 528 NOK per ton CO_2 emissions, which indicates a tax approximately two to four times as high as the market price of CO_2.

The exemption from the CO_2 tax for the fishing fleet operating in coastal waters was introduced in 1988, due to the difficult economic situation in the industry. At that time the tax amounted to 0.21 NOK/litre oil, and it has increased to 1.599 NOK/litre today (2012). In Figure 2, the average operating margin in the Norwegian fishing fleet is portrayed. It should, however, be noted that the average operating margin hides huge variations between different vessel groups. In 2010 it varied from -1.5 per cent (pelagic coastal vessels under 11 metres) to 27.8 per cent (large purse seiners). As will be discussed below the rationale for supporting the fishing industry has dwindled since the late 1980s.

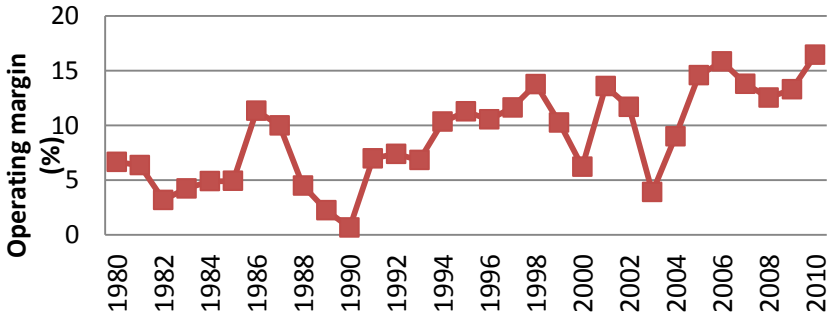

Figure 2. Average operating margin (EBIT's share of turnover) in the Norwegian fishing fleet, 1980–2010. Source: Directorate of Fisheries

At hand for evaluating subsidies within fisheries is the well-developed bioeconomic analysis. Theory, together with empirical evidence, demonstrates that fish resources, left un-regulated with free access usually will lead to over-exploitation and dissipation of resource rent (Hannesson, 1991; Flaaten, 2011). Simple bioeconomic models usually do not portray the heterogeneity of vessels and fisheries, but nevertheless give an informative and clear view of how subsidies distort the industry. Revenue enhancing and cost reducing support contribute even further to the free access waste, by augmenting effort and reducing fish stocks (Brochmann, 1981; Hannesson, 1991; Porter, 2003). However, the biological effects from subsidies are different when property rights and good management systems are in place, which mainly is the case in Norwegian fisheries.

We analyze how cancelling the fuel tax exemptions will affect the economic performance of two different vessel groups in the Norwegian fishing fleet, and discuss possible implications for management and industry from such a policy reform. Profitability change from a fuel price increase is analysed by way of a sensitivity analysis. The profitability survey's cost and earnings data is the basis, and by changing the fuel cost item (and the labour cost accordingly[iii]) we find the fuel cost increase necessary for a "break even" result (EBIT=0), assuming that there are no effects on harvest- and stock dependent costs. Thus this is a short run bioeconomic analysis. In order to add "practitioners' wisdom and experience" to the desk study, we address vessel owners in some vessel groups – ranging from the smallest to the largest – with telephone interviews, asking them what consequences different fuel price increases would mean to their fishing operations and operational decisions. Interviews were carried out in December 2008, where prices were back to "normal" half a year after a considerable price shock (30 per cent) on marine gas oil, and we avoided questions addressing a tax increase directly in order not to get "politicized" answers.

The two vessel groups analysed are very different: The first consists of smaller coastal vessels (10–15 meters) targeting demersal species, while the second is the large purse seiners which fish for pelagic species. The former is the most numerous group in the Norwegian fishing fleet, with 686 vessels (40 per cent of the total number of whole-year operated vessels in 2007, and the latter is the 45 purse seiners with the additional blue whiting trawl license, which catch constituted 36 per cent of the total Norwegian catch that year. For the coastal vessels cod is the most important species, amounting to 39 and 56 per cent of total catch volume and value, respectively, while for the purse seiners (vessels of 50–90 meters length) in 2007 the herring volume and value constituted 38 and 43 per cent, respectively, of the total catch of this vessel group. Both groups have that in common that they are very fuel efficient in their fishing operation, compared to other vessel groups (Ellingsen & Lønseth, 2005; Schau *et al.*, 2009).

Through the lay system, the crew on the coastal vessels bears some of the increased fuel costs. On the other hand, the off-shore vessels can bunker tax free when fishing in distant waters. Thus, the fuel cost increase they incur is less than the cost increase the coastal fleet experience. Coastal vessels, based on 2007 data, would experience a fuel cost increase in the range of 19–24 per cent, while off-shore vessels would only see an increase of 15 per cent.

The off-shore vessels' estimated EBIT is reduced by 15 per cent, whereas the effect for the coastal vessels is between 5 and 12 per cent. This coarse analysis shows that, on average, the effect from annulling the reimbursement scheme is detrimental, but relatively modest. Annulling the scheme would not render the Norwegian fishing fleet unprofitable.

Fuel is utilized to different degrees across Norwegian fishing vessels. While in some fisheries it constitutes only a small part of the total costs, it is substantial in others, usually gear and size dependent. In 2007, fuel costs constituted on average 24 per cent of the total costs (crew remuneration excluded) in the fleet. However, in the coastal fleet (<28m) the share was 15 per cent, while 28 per cent for the off-shore fleet (>28m). A more fine grained analysis reveals that the fuel cost share of total costs vary between 11 and 33 per cent. Another dimension is that the price demanded for fuel differs with the size of the vessels, and rather large rebates are conceded to larger vessels and high consumption. According to the figures from GfF, larger vessels

(>28m) on average paid an oil price 20 per cent lower than the smallest vessels (<8m) in 2007. On the other hand, most of the reimbursement of mineral oil tax goes to the largest vessels.

In 2007 roughly 4 000 vessels were reimbursed the mineral oil tax, as shown in Figure 3a; 242 large vessels (6 per cent) received 71 per cent of the mNOK 246 reimbursement. In fact, six off-shore vessels covered the same amount of reimbursed fuel as the 1 545 vessels below 10 meters. Hence, vessels less than 28 meters (94 per cent) received only 29 per cent of the sum in 2007. Recalling that larger vessels pay a lower fuel price and are, to some degree, able to refuel tax-free (abroad or domestically??), the support from the reimbursement/exemption constitute a greater share of their fuel price than in the case of smaller vessels paying higher prices. Figure 3b reveals the development in the nominal fuel price and the mineral oil tax in 1999–2012.

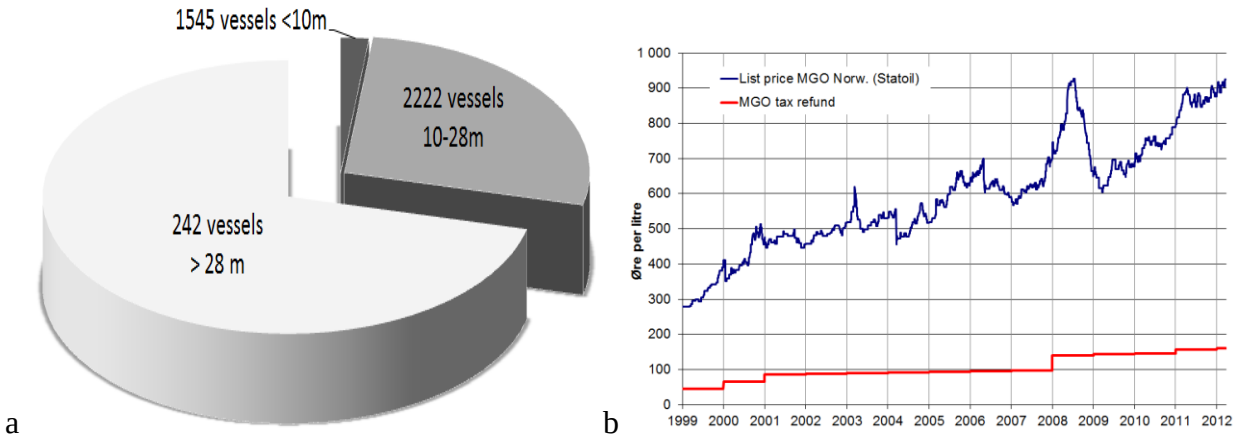

Figure 3. Distribution of fuel tax reimbursement by vessel size (left) in 2007, and MGO price and tax development, 1999–2012 (right). Source: GfF, Statoil

The fuel cost increases which would render the average vessel going break-even (EBIT=0) are shown in Figure 4 for twelve vessel groups; with averages for the four years 2004–2007 in order to smooth out annually shocks. There is a huge variation in the results. For shrimp and saithe trawlers, with a negative operation profit, a fuel price reduction is needed to achieve break-even. Trawlers – in general – are sensitive to a fuel price increase, whereas coastal vessels and purse seiners could endure a 200–350 per cent fuel price increase. Note that these are vessel group means and that individual vessels' performance can deviate substantially. Furthermore, being a static analysis, implicitly it has been assumed that the vessel groups – on average – would generate the same revenues and costs in the same manner under a fuel price increase as was the case for the 2004–2007 average. This is a relatively strong assumption since vessel owners, under the influence or even expectations of fuel price increases, would act in order to mitigate such cost increases. Such adaptation strategies, both in the short and longer term, and especially for the two vessel groups under scrutiny, will be discussed in greater details beneath.

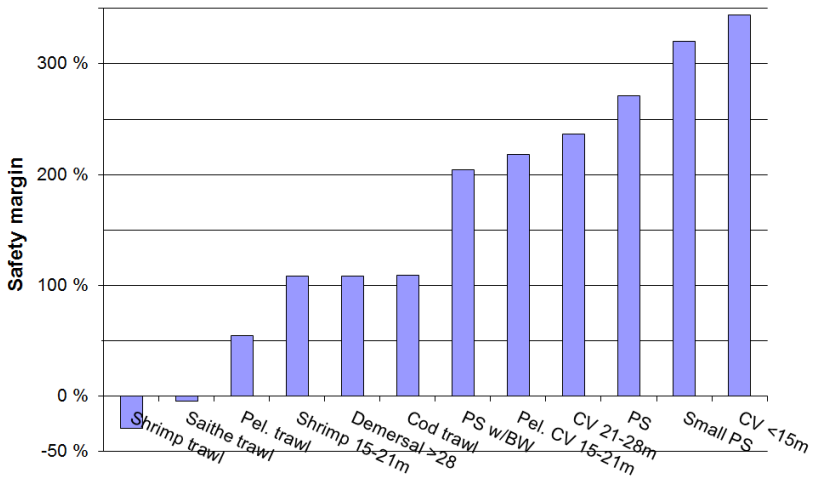

Figure 4. Fuel price increase "safety margin" for vessel groups with respect to fuel price (increase needed for "break-even" result), mean for 2004–2007. (Abbrevations: Pel.=pelagic, PS=purse seine, BW=blue whiting trawl license, CV=coastal vessels)

DISCUSSION

The analysis has demonstrated that the mineral oil tax exemptions are not a prerequisite for a profitable Norwegian fishing fleet. Of the population of 1700 whole year operated vessels, only two out of 18 vessel groups – representing about 15 vessels – had deficits for the period 2004–2007. And the development in profitability after 2007 (according to Figure 2) should not set off any alarm bells in that respect either.

In an almost Parliament-wide compromise as a measure to promote more climate friendly conduct, a proposal was set forth to consider phasing out the fishing industry's fuel tax exemptions. At the present point of time (2012), however, the reimbursement scheme is still in effect.

The importance of the subsidy elements of the Norwegian tax exemptions depend to a large extent of the perspective. The fish industry is to a large extent export oriented - thus in competition with fish from other countries and food sources. A survey of the fuel tax regimes in our neighbouring coastal states shows that none of their fleets are charged taxes on fuel (see Isaksen & Hermansen, 2009). Compared to this, the Norwegian regime implies no subsidies. Compared with other Norwegian industries the picture gets more complicated. Some industries, like airline, shipping and oil production, are totally exempted, as in most countries. Others, e.g. wood and fishmeal processing industries, pay half tax on their fuel consumption. Employing this perspective, there is an element of subsidies, but the amount is difficult to estimate, due to the tax rate differences.

The fishing fleet can to some degree adapt to increased fuel prices. However, a political proposal on taxation would for sure be met with lobbyism against such measures. As underlined by one of the respondents when asked how an annulment would affect his adjustment: "*... one possible response would be to drop 100 tons of herring outside the Parliament!*" Even if the probability

of such actions may be low, one should not underestimate stakeholders' will to retain granted rights. Another dimension of this is the ability of the upstream link in the seafood value chain to shift the burden from this tax over to the consecutive downstream links, i.e. the fish processors. This will depend on the competitive conditions in the market (Bendiksen 2008). In Norway, fishermen's organizations have considerable market power in the first hand market for fish, which could vouch for a shift of the duty to adjacent stages in the value chain.

Do fishing vessels have possibilities for substituting away from marine gas oil? In the short run the way to adapt to increased fuel prices is to alter the way of operating the vessel, by minimizing the steaming between port and fishing ground and by reducing the speed. Vessels may concentrate fishing activities to periods and areas where the fish abundance is high, and greater load before going to port. Fisheries with marginal profitability might be rendered unprofitable and phased out. In the longer run, a substantial and persistent fuel price increase would induce increased adjustment possibilities, such as more energy efficient fishing vessels and gear and shift of quota rights from less to more energy inefficient gear, if allowed.

For the smaller coastal vessels an annulment of the reimbursement scheme would be relatively small. Oil constitutes a relatively low cost for these vessels, and they have limited possibilities for substitution. Oil price increase effects in this vessel group could either be to withdraw from fishing for lower valued species (especially saithe, but also haddock) and from fishing from distant ports (i.e. spring cod fishery in Finnmark). All in all, however, the operational effect in this group would probably be marginal.

For purse seiners with the additional trawl license for blue whiting, the adjustment possibilities are greater than for the smaller coastal vessels. The most likely adaptations would be to phase out fisheries with little and uncertain profitability, such as the North Sea herring with limited quotas, and the horse mackerel fishery. For the blue whiting fishery west of Ireland and the capelin fishery in the Icelandic zone fishing could either be phased out or deliveries would be done in Ireland/Iceland in order to reduce steaming. For other vessel groups the economic effect could be more substantial, especially to those at the left in Figure 4. In case of a reimbursement scheme annulment the landing-abroad effect would be greater and may take place in all fisheries, since vessels then could take an advantage of lower fuel prices abroad. Refueling at the open sea from foreign tanker vessels may also be an option, especially for larger fishing vessels (Isaksen and Hermansen, 2009).

The rationale behind environmental taxation is to reduce emissions harming the global climate and the local environmental conditions. For some fisheries and vessel groups, the chosen adaptations may result in higher emissions in order to avoid taxed fuel, which clearly is counter-productive. In addition, in case of comparatively high Norwegian fuel prices in the future, vessels would deliver their fish abroad, and hence reduce the supply to the Norwegian fish processing industry.

The substantiated or potential effects from taxation constitute important information for policy makers. Undoubtedly this scheme is an industry support that should be abolished, especially since the worst emitters get the highest relief from it. However, removing this support would, according to our analysis, spur incentives and responses in the fleet that could bring about

unfavorable consequences, especially shift in demand towards foreign "un-taxed" fuel and a shift in supply of fish towards landings abroad. Some distributional effects also come into place since smaller energy effective vessels have considerably less opportunities to avoiding the tax.

A good solution to protect the environment from GHG emissions from the fishing fleet calls for an international harmonization of fuel taxes among nations. However, in light of the efforts incurred to achieve international fuel tax agreements for similar industries (i.e. airlines and shipping) the international community does not seem ready for this yet.

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ENDNOTES

[i] Bjorn Brochmann MSc was in 1980 on leave from the Ministry of Fisheries to the Norwegian College of Fishery Science when writing this article. Later, when back at the Ministry, he argued internally and externally for the abolishment of the fisheries subsidies. The reaction from the industry was fierce, some demanding the Minister to sack Director Brochmann, but without success. Gradually also the industry representatives, led by the powerful Federation of Fishermen, came to understand that subsidies were not sustainable.

[ii] The sulphur tax is only levied on those fishing in coastal/near waters, and no reimbursement is given. Steinshamn (2008) point to the fact that this fleet was responsible of 5 per cent of emissions, but paid about 11 per cent of the total SO_2-tax. However, he claims, sulphur emissions are responsible for local – not global – pollution damages, which makes it rational that less mobile vessels are levied this tax, and not those operating in distant waters.

[iii] Labour costs in Norwegian fisheries are normally calculated as a share of revenues minus some vessel costs. In the coastal fleet (vessel permissions less than 28 meters) crew shares are calculated from revenues *minus* fuel costs, as opposite to the larger off-shore vessels. Coastal vessel owners can therefore "shift" some of the fuel cost increase over to the crew. Hence, fuel price increases' effect on profitability is smaller in the coastal fleet than in the off-shore fleet.

Documenting sustainability for value-added fish products

Aschan, Michaela; Armstrong, Claire; Borit, Melania; Nielsen, Kaare; Primicerio, Raul; Olsen, Petter

File Name: Aschan 245 IIFET.pdf
Size: 1.844Mb
Format: PDF
Description: Presentation

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URI: http://hdl.handle.net/1957/55159
Date: 2014-07-07

Abstract:

There are three main aspects of sustainability; the environmental, the social and the economic. When it comes to fisheries, stock sustainability is particularly important and the stock and ecosystem health has significant effects both on the environment and on the sector economy. In order to add value to a product, sustainability needs to be documented and communicated to the buyer and the end-consumer. Recent studies in British supermarkets have shown that a price premium exists, and commonly it is between 10 and 20%. Sustainability initiatives in marine resource management have tended to emphasize biological sustainability only, typically through green certification schemes. However, there is clearly also potential for adding value though documenting the social and economic sustainability dimensions. This potential creates an incentive for the operators (organized groups of fishermen) to develop transparent management plans where all aspects of sustainability are taken into account. This presentation summarizes various sustainability indicators for the fisheries sector; it explains what the indicators mean, and how they are interrelated, and exemplifies how they may be used in management plans to achieve value added fish products.

Description:

Presentation

Subject: Fisheries-Economic Aspects-Congresses
Sustainable Fisheries-Congresses
Keyword: Fisheries Economics
Markets: Sustainability and Certification
Markets and Trade

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Value-Adding for Captured Fish Products by Documenting Sustainability

Olsen, Petter

File Name: Olsen 467 IIFET.pdf
Size: 1.266Mb
Format: PDF
Description: Presentation

View/Open

URI: http://hdl.handle.net/1957/55205
Date: 2014-07-07

Abstract:

The documentation of sustainability constitutes a significant opportunity for product value-adding in the captured fish sector, and a means of differentiating sustainably caught and landed fish from inferior alternatives. In the industry-owned R&D project WhiteFish the main objective is to create a tool for catch and processing SMEs in the captured fish supply chain that will enable them to document degree of sustainability on single batch / trip level. A number of biologic, environmental, social and economic indicators have been defined, and after initial configuration only a few daily recordings are needed to enable the generation of a "Sustainability Certificate", highlighting degree of sustainability for the batch / trip in question in all these areas, including a rough estimate of carbon footprint. WhiteFishMaLL is the consumer-oriented follow-up to WhiteFish where, after conducting detailed interviews and getting feedback from focus groups, consumers indicated what sustainability-related information they are most interested in, and how they prefer to get access to it. Based on this, batch-specific QR-codes with link to extended product information (including sustainability information) were developed and deployed in cod and haddock supply chains, enabling environmentally conscious consumers in UK fish&chip shops to scan the code and get access to previously unavailable product information. This presentation will use the outcomes and experiences from these two projects to illustrate that value-adding for captured fish products by documenting sustainability is a very real and present possibility.

Subject: Fisheries-Economic Aspects-Congresses
Sustainable Fisheries-Congresses
Keyword: Fisheries Economics
Markets: Sustainability and Certification
Markets and Trade

Poor rich-country industries: Fish-processing industries out-competed by low-labour-cost countries?

Iversen, Audun; Bendiksen, Bjørn-Inge

File Name: Iversen and Bendiksen - IIFET 2012.pdf View/Open
Size: 2.165Mb
Format: PDF
Description: Poor rich-country industries: Fish-processing industries out-competed by low-labour-cost countries? (presentation)

URI: http://hdl.handle.net/1957/35112
Date: 2012

Abstract:

The authors pose the following: "Is it possible for the remaining fish-processing industry in Norway to survive in the future?" They discuss the relative advantages of doing processing in 'rich' versus 'poor' countries. There are some location advantages for Norwegian fish processors, but these can be difficult to exploit. To truly understand the nuances of competition, it must be studied from various levels - country, firm and institution.

Keyword: Fisheries Economics
Markets and Trade
Business strategy

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- Conference Papers and Presentations (IIFET 2012)

Stubborn Fuel Tax Concessions – The Case of Fisheries in Norway

Flaaten, Ola; Isaksen, John R.; Hermansen, Øystein

File Name: Flaaten IIFET 231.pdf
Size: 966.3Kb
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Abstract:

On the background of the abolishment of traditional subsidies this paper discusses the persistency of the major remaining subsidy scheme in Norwegian fisheries: exemption from fuel taxes. The reimbursement scheme stems from the late 1980s, and has been persistent since, under different governments. This paper gives the background for this support against theoretical predictions on subsidies' effects on fishing behaviour and profitability. For 2011 the estimated exempted fuel taxes to the fishing fleet is 999.0 million NOK, amounting to 6.3 per cent of the landed value, against 772.7 million NOK (6.4 per cent of landed value) in 2007. Also, the Norwegian scheme is discussed against similar arrangements in other countries. The national fishing fleet is heterogeneous with respect to oil consumption in transport and fishing operations. Hence, the effect of the fuel subsidies is different along different fleet components. The implications of abolishing this subsidy for the fishing fleet in general, for different vessel groups, as well as for policy implications are discussed.

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DO SCM "IDEALS" PREVAIL?

A CASE STUDY FROM THE NORWEGIAN FISH PROCESSING INDUSTRY

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ABSTRACT

Purpose of this paper
We seek to explain the differences in adherence to SCM principles in two supply chains (SCs) in the same industry, and point out the inadequacy of general theoretical recommendation.

Design/methodology/approach
Explorative case study approach, where the SCM practice of two SCs in the Norwegian fish processing industry is examined against the "ideal". The two SC's coherence to these "ideals" is portrayed in light of their long-term financial performance.

Findings
The two SCs exhibit great variation in SCM practice, even though they share the same raw material input base and vendors. Coherence to "ideal" SCM practices seems unrelated to long-term performance. Hence, practice and outcome deviate substantially from theoretical prescriptions.

Research limitations/implications
The focus on two SCs in one industrial context limits the generalizability of the findings. Also, the operationalisation of SCM "ideals", and the subjectivity when assigning adherence scores to these, limits external validity.

Practical implications
Observations underline that SCM practice needs to take individual SC challenges and context into account, due to resource requirement dependence. Especially the unpredictable supply present in our setting has great influence on the design of adequate SCs.

Originality/value
Mapping two SCs in the same industry, which utilise the same raw material, adds insights to formal theory prescriptions. By narrowing the setting to one industry, we avoid a potential industry effect when comparing SCM practices to long-term performance (i.e. competitive advantage). Underlining the contextual setting and knowledge to the industry in question, our paper attempts to bridge the gap between reality and theory.

Keywords: SCM ideals, Supply uncertainty, Norwegian fish product supply chains.

1. INTRODUCTION

This paper addresses whether prescriptions from the supply chain management (SCM) literature result in better performance and enhanced competitive advantage, as advocated by its proponents (Araujo *et al*. 1999; Dyer & Sing, 1998; Lee, 2002). This as such is important of several reasons. First, firms adopt and try to benefit from theoretical knowledge (of different kinds) to improve their performance, and thus enhance their possibilities to survive and prosper.

In this paper we adopt established prescriptions for supply chain management (SCM) and examine whether these prescriptions are applied in practice. Our empirical context is two supply chains operating in the same industry. Further, we evaluate whether following the prescriptions result in improved performance.

The remaining part of this paper is organised as follows: In the next section we review selected elements of the SCM literature of particular importance for our study – including how supply uncertainty is treated. We do so because SCM challenges are the greatest when supply uncertainty is substantial. Then we present our empirical setting, and a more detailed presentation of the two supply chains in question. Then we map how the two supply chains adhere to central SCM-criteria, and report our findings. Finally we summarize our findings, draw conclusions and discuss implications.

2. LITERATURE REVIEW

In this section we first address and try to clarify the concept of "Supply Chain Management" (SCM). We do so because the concept is ambiguous, and that some common understanding is needed for communication purposes. We also review some central aspects of this literature as basis for our perspective and arguments.

Based on an extensive review of literature, Mentzer *et al*. (2001) conclude that more than 100 different definitions of SCM exist. Inspection of the various definitions reveals that they vary significantly, both in content and scope, and cover a great variety of organisational acticities. However, most scholars agree that SCM involves *"...the integration of business processes from end users through original suppliers that provides products, services and information that add value to customers and stakeholders"* (Lambert & Cooper, 2000, p. 66). This corresponds to the idea of the value system (Porter, 1985) that the traditional view of the firm as a single entity is insufficient to explain competitive advantages. Rather, the focus should be on systems of firms conducting subsequent activities in order to fulfill consumers' demand. According to Kopczak & Johnson (2003) the fundamental business problem from the view-point of the entire supply chain is to supply products that meet the demand in a complex and uncertain world. SCM has adopted an efficiency view, where primary goals are to increase productivity and reduce costs (Chandra & Kumar, 2000). A central theme emphasised in the SCM literature is that if every link of the chain focuses on a set of corresponding and compatible goals, and openly shares information, redundant and duplicated effort can be reduced (Spekman *et al*., 1998).

The lion's share of empirical studies on SCM is conducted in environments where the supply situation is relatively stable. When exposed to uncertainty, SCM challenges increase, and co-

ordinating tasks become more complex. In our case, supply is almost stochastic. First, in Table 1, we present the fundamental characteristics of the ideally managed supply chain.

Table 1. Features supporting the ideally managed supply chain. Source: Storey et al. (2006)

1	A seamless flow of goods from initial source to end consumer with few interruptions
2	Supply is demand-driven, where only demanded goods are produced (*Sell one/make one*) with continuous stock monitoring. In optimum no inventories – all products direct to shelf
3	Shared information throughout the chain. All actors know what goes in or out of chain
4	Collaboration and partnership creates win-win situations. All benefit from mutual gains
5	The supply chain is IT-enabled and -supported
6	Batches are configured to the rate of sale
7	Customer responsiveness. Flexible and reacts quickly to end customer preference changes
8	Agile and lean (leagile/agilean)
9	Mass customisation (large scale customisation to a mass product price)
10	Market segmentation – by identifying main customers and customer groups

All the portrayed "*characteristics underpinning the ideally managed supply chain*" (op cit. p.760) in Table 1, focus on effectiveness and the need for mitigating uncertainties in the supply chain. Environmental fluctuations impose uncertainties to organizations, to which they try to adapt, and: *"organizations will seek to buffer environmental influences surrounding their technical cores*[1] *with input and output components"* (Thompson 1967: 20). The Table 1 items represent ways to isolate the supply chain's technical cores from environmental uncertainty. Under complete predictable supply and demand conditions, implementing such principles would be redundant, since production is levelled according to accurate forecasts.

A critical remark against the SCM is its metaphoric nature and the lack of guidelines for practitioners. This makes the correspondence between theoretical prescriptions and real-life approaches hard to capture, and proper operationalisations of utilized concepts are needed. In the next section, the challenges to SCM imposed by uncertainty will be addressed.

2.1. SCM and uncertainty

In the SCM literature uncertainty is dealt with in different ways. In the core of logistics lies the imperative that all supply chain processes (from raw material to the customer) should add value to the product. If added resources do not contribute to enhance the end product's value, it is waste, and should be eliminated. In a "one sold, one made" perspective, inventories are the most obvious case of waste. When embedded in an uncertain environment, uncertainty will propagate through the entire supply chain system and complicate SCM (Davis, 1993). Uncertainties in the supply chain, occurring between processes or stages in the chain, are most often assured against by the use of inventories – i.e. "*protection against life in an uncertain world*" (ibid., p. 38) – or by providing excess capacity (Vorst *et al*., 1998). Buffers, in *time*, *capacity* or *inventory* – to cope with uncertainty – leads to inefficient processing and non-value activities (Vorst & Beulens, 2002).

One of the most influential treatments of uncertainty within the SCM literature stems from Fisher (1997). In his framework the product type is decisive for the choice of supply chain.

[1] Rajola (2003:9) defines the *technical core* of an organization as: *"the company's 'engine room', i.e., the area where product/service production takes place. Such an area needs to be protected and preserved from external influences because it produces efficiency and therefore needs stability."*

The distinction goes between "functional" and "innovative" product: By "functional", Fisher means products that satisfy basic needs, have long life cycles and enjoy a stable, predictable demand, while "innovative" products have short life cycles, exhibit great product variety, and meet unstable, unpredictable demand in their markets. According to Fisher, supply chains should focus on efficiency ("lean") to minimise costs for functional products. For innovative products, supply chains should be designed for responsiveness ("agility")[2] to avoid expensive market mismatches. The reason underlying the two suggested supply chains is variation in level of uncertainty surrounding demand for the two types of products. Stable demand allows focusing on efficiency and low cost. Volatility in demand for innovative products places greater risks on producers in terms of shortage or excess supply. Such risk is escalated by shorter product life cycles, which favour a market-responsive supply chain.

Lee (2002) elaborates Fisher's uncertainty treatment by also including disturbances on the *supply side* of the manufacturing process. He distinguishes between stable and evolving supply conditions: *"A 'stable' supply process is one where the manufacturing process and the underlying technology are mature and the supply base is well established. An 'evolving' supply process is where the manufacturing process and the underlying technology are still under early development and are rapidly changing, and as a result the supply base may be limited in both size and experience"* (p 107). Lee acknowledges that food products might have a stable demand but a highly variable supply side, since quantity and quality depends on weather conditions: a situation suitable for our setting. Based on product type (functional or innovative) and supply conditions (stable or evolving), he prescribes four distinct types of supply chain strategies, in order to reduce uncertainties on the supply and/or demand side. One of them is a risk hedging strategy, appropriate for functional products under evolving supply processes. Inventories are then pooled and resources shared among supply chain participants, which shields individual actors against the risks associated with supply disruptions, by sharing safety stocks with other actors. Inventory pools decouple the supply chain effectively, and, for downstream firms, multiple supply bases safeguards backup supply.

Mason-Jones *et al*. (2000) combine leanness and agility in the same supply chain, as an equivalent, yet opposite, approach. In their hybrid strategy, "leanness" is retained upstream of a determined *decoupling point*[3], while processes downstream this point focus on flexibility (agility). This strategy is in their view better able to ensure best practice SCM when early supply chain stages are rather stable whilst end-markets are calling for increased attention.

Supply chain managers are exposed to multiple forms of uncertainty, and the need for SCM is related to the development of the competitive business landscape in the late 1980's and early 1990's (see e.g. Ellram, 1991; Hutt & Speh, 2004). Globalization, market deregulation, and technological progress, have created greater competitive pressure, both within and between nations. However, no general SCM prescriptions exist on how to diagnose and take action against contingencies, and managers' perceptions of uncertainties might vary significantly. In the following section we present some specific contingencies in the setting under scrutiny, which create uncertainty and deserve managers' attention.

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[2] Christopher's (2000) distinction between the leanness and agility is close to Fisher's emphasis on market responsiveness and physical efficiency; where *leanness* suits high volumes, homogenous products with predictable demand like commodities, *agility* suits low volumes, differentiated products with high demand variability.

[3] Following Olhager *et al.*'s definition (2006:19): *"A decoupling point divides the value chain into two distinct parts; one upstream with certain characteristics and one downstream with distinctly different characteristics."*

3. INDUSTRY SPECIFIC SCM CHALLENGES

Here, the Norwegian fish processing industry is accounted for. We also emphasise the challenges involved when coordinating the supply chain stages. The industry consists of about 500 firms within about 11 branches – defined by the main products they bring to the market. Here we concentrate on the stockfish and whitefish filleting branches to capture how firms make different adaptations in this industry environment. Both branches share the same supply base, and in many instances they are served by the same raw material vendors; fishing vessels of varying size using different gears, from small coastal vessels fishing with hand line and long line to large ocean trawlers. Different vessels catch different types of fish, and different gears usually catch fish of different sizes. The quality of the catch varies with season, gear and handling on board, and when quality at first is lost it cannot be recovered at later stages in the supply chain. The most important whitefish species are cod, haddock and saithe. The Northeast Arctic cod is the most important species – for fishermen as well as processors – both in terms of catch value and volume. Biological features like migration patterns, weather conditions and abundancy create a seasonal supply with high degree of variability. For cod, this is portrayed by the seasonality of the two main fisheries. First, from habiting in the Barents Sea, mature cod migrate to the coast of North Norway (mainly Lofoten) to spawn in period February–April. Secondly, younger year-classes of the cod – feeding on capelin – follow the capelin on its way to spawn at the Finnmark coast in the period March–May. These are the main seasons for coastal vessels, but while they during the Lofoten fishery bring ashore large sized cod of great quality and value, the landings from the Finnmark fishery are smaller sized cod, with potential quality weaknesses. Larger vessels (like trawlers) are less weather dependent for operating, usually fish far off shore and catch fish of smaller size.

Fishing is an highly regulated activity. The authorities set regulations on gears, fishing seasons and vessels. Following advices from the International Council for the Exploration of the Sea (ICES) and bi- and multilateral negotiations, the Government allocates the Norwegian quotas to fishermen. In addition, the value chain link between the fishing and fish processing industry in Norway is substantially regulated. One example is that only registered fishermen are allowed to own and operate registered fishing vessels, leaving fish processing firms precluded from upstream vertical integration. However, some exemptions are granted. Today most fresh fish and round fish freezing trawlers are owned by whitefish filleting firms. Integration towards other parts of the fishing fleet is nearly absent. In additional, sales organizations collectively owned by the fishermen, have legislative monopoly rights to attend all first-hand sales of fish. These sales organizations can also unilaterally determine minimum prices for fish, though in practice, prices are set after negotiations with fish processing firms' associations. Further, fish processing firms are prevented from purchasing the 'most wanted' part of fish from vessels, and must buy the whole catch from each vessel. Usually, fishermen catch a great deal of by-catch species, even when targeting only one.

In supply chains for fresh food, as in the present case, adequate supply is seldom satisfied by stand-alone firms, due to perishability and shelf life constraints (Vorst & Beulens, 2002). Raw material vendors, serving the fish processing industry with its most important input, operate under many and, in part, severe regulations due to the restrictions imposed on actors. Catch quotas and fish stock composition fluctuate from year to year, and variations in weather conditions, abundance and availability lead to catch variations from month to month, week to week and from day to day. The supply of fish is thus associated with great uncertainty, both with regard to volume of landings, quality, and the sort and size of fish supplied. Hence, Burt & Pinkerton's (2003: 64) definition of procurement as: *"...the systematic process of deciding what, when, and how much to purchase; (...) and the process of ensuring that what is*

required is received on time in the quantity and quality specified" becomes an ideal – far from the reality perceived by managers of fish processing firms.

Fish is an easily perishable good. The species available to our industry, whose natural habitat holds sea water temperatures well below 10°C, are even more exposed to perishability than agricultural products. This since the natural bacterial flora in these fish is not curtailed by product cooling in the range of 2–6°C, which is the temperature in retailers' display counters for fresh products. Perishability creates uncertainty in food supply chains (Hobbs & Young, 2000; Georgiadis *et al*., 2005; Vorst *et al*., 2001). Suppliers meet uncertainty when locating a buyer fast, since fish cannot endure long breaks on its journey to the market. In many cases suppliers are prevented from warehousing products in hope for improved market possibilities.

Vorst *et al*. (1998) identify inherent uncertainty as especially present in food supply chains, which relates to natural variations in quality, seasonal patterns, weather and biology. In the industry addressed here, supply management becomes a critical task. The nature of the supply uncertainty fish processing firms are facing can be deemed different from the supply uncertainty described in SCM literature. Davis' (1993) definition of supply uncertainty *"...relates to the unpredictable nature of the quantity, quality and timing of supply, which can occur due to (1) various manufacturing or logistical problems, (2) unresponsiveness to change in volume or product specification and (3) opportunistic behaviour."* No doubt, managers of fish processing firms struggle against the quantity, quality and timing of supply, on a daily basis. The problems are, however, neither due to manufacturing or logistical problems (in a narrow sense), nor the unresponsiveness or opportunistic behaviour of suppliers. Without rejecting these arguments as uncertainty sources, the major cause of uncertainty that demands managers attention is the harvesting and supply of a biological resource, where variations in weather, abundancy and composition makes timing, quality and quantity of supply almost stochastic. These sources of uncertainty can only to a minor degree be remedied by strategic purchasing, long-term relationships, inter-firm communication, cross-organizational teams and supplier integration (Paulraj & Chen, 2007). The only way to reduce this kind of uncertainty by SCM is to increase the amount of information exchange up- and downstream the chain, and by adopting safeguarding procedures.

Seasonality of the supply, created by the biological nature of this raw material, imposes high levels of uncertainty in the factor market and reduces predictability in the whole supply chain. In some important fish markets consumption is also seasonal. For instance, in Brazil, one of Norway's most important markets for clipfish, roughly 80 per cent is sold and consumed during Christmas or Easter holidays. This underlines the severity of the Bullwhip effect in this supply chain, where demand variability in end markets seems to have a self-reinforcing effect through inventories upward the supply chain. Taylor & Fearne (2006) address the challenge for food supply chains – partly due to the mature and highly competitive food retail market – in the following manner: "*...fragmentation and commodity culture invariably leaves primary producers at the end of a long bullwhip, struggling with the significant challenge of balancing inherent uncertainty in supply with growing uncertainty in demand*" (p. 376).

Another feature of the Norwegian fisheries industry is its strong export orientation, where estimates of the export share is in the range of 90–98 per cent. Most of the industry actors – from raw material vendors to exporters – are small and medium sized enterprises. Hence, when opposing international food producers or global retail chains with great purchasing and bargaining power, "terms of trade" easily are foreseen as forced upon them. The global market for whitefish is regarded as both highly competitive and uncertain (Haugland & Grønhaug, 1996), where Norwegian whitefish export is organized as at typical "middleman business", similar to commodity markets, where "*...transactions follow a repetitive pattern,*

with both exporters and importers having their regular trading partners" (Dulsrud & Grønhaug, 2007: 11). Since few quality standards exist for these products and product quality is dependent on mode of transport, the exporter have usually more information on product conditions than the importer, who often is unable to ascertain product quality until after delivery. In this context, trust between sellers and buyers is crucial, written documentation is scarce and few transactions follow formal contracts. Reneging occurs seldom, but would have immense financial consequences for the seller, in line with complaints and returns (op. cit).

Fish product supply chains are characterised as push, rather than pull, systems. Traditionally, the Norwegian fisheries industry is characterised as volume oriented, where target figures are related to production yields, batch sizes, and inventories rather than balancing production with consumer demands. The development in food supply chains the latter decades have been one where power have shifted from manufacturers to groups of retailers. This has in turn left food products as "*...functional products with volatile and unpredictable demand*", since "*retailers set the prices and demand frequent and responsive deliveries at short notice*" (Vorst *et al*., 2001, p. 74). In our analysis, the total supply chain will be considered, but the emphasis will be placed on the supply side; an environment common for most all branches of the Norwegian fish processing industry. This is also the business area that deserves the most attention from managers in this industry (Ottesen & Grønhaug, 2002, 2003).

4. TWO FISH PROCESSING INDUSTRY SUPPLY CHAINS

In the following sections, two supply chains in the Norwegian fish processing industry – stockfish and white fish fillet – are described. Common for both supply chains are the supply challenges noted above. The two are chosen since they represent entirely different approaches to the uncertainty in the supply environment. Both chains are defined from the main product they bring to market, as recommended by New (1997). However, in the view of central SCM practices, they are dissimilar in many respects, as will be made clear from the discussion to follow. The main data source is the profitability study for the industry (Bendiksen, 2010).

4.1. The stockfish supply chain

Within the fish processing industry 26 firms are identified as mainly stockfish producers, all located in Lofoten, with a total turnover of mill NOK 651 and an employment of about 194 man-years in 2009. Drying is the oldest kind of fish preservation in Norway – with a history going back to the Viking age – and stockfish is probably the oldest Norwegian export article. The largest market for stockfish is Italy, who receives the best, most valuable stockfish made of cod. Stockfish is also exported to other nations, especially Nigeria and Croatia. In the following, the stockfish supply channel is described for export to Italy, the single most important market which takes about 85 per cent of the Lofoten-dried cod.

The fish is caught outside Lofoten, mainly with size selective gears (e.g. gill-nets), mainly in March. The fish is normally stored on board no longer than 6–10 hours before landed (headed and gutted) to processors. There, the fish is rinsed, two and two fish's tails are tied together, and then hung on drying racks, where it hangs to dry from early March until mid-June. Then it is taken in-house for subsequently drying. From August, professional graders sort the fish into about 17 different qualities, before it is pressed together in batches of 25–50 kilos and sewn in gunny sacks, ready for exports. Most of the production is sold during the autumn; some in the spring, but the end-product can be stored for until a year. When exporting the stockfish, most producers use agents as middlemen, but some export on their own and appear

as personal representatives when meeting importers[4]. Stockfish is a very expensive product and potential deterioration is often not discovered until the product reaches the "soaker". There the fish is diluted for approximately 10 days, until it gains about the same weight as before drying, and thereafter sent to retailers or restaurants. Italy is in reality five regional markets, with great regional differences between how stockfish is preferred and prepared.

4.2. The whitefish filleting supply chain

In 2009 there were 9 active whitefish filleting processors in Norway, all but one located in the north. They had a turnover of mNOK 1,537 and employment was 720 man-years. In 1999 the number of firms was 19, turnover mNOK 2,038 and employment 1,530 man-years. This industry branch has played an immense role as main employers, and/or sole recipients of fish, in coastal communities. Due to their importance as local employers and need for raw materials, these firms have often been granted ownership to large fresh fish trawlers that could supply them continuously. Even though many of these firms have trawler fleet serving them with most of their inputs, they also purchase fish from other, smaller vessels.

We concentrate our discussion on the most important product from this supply chain: the 400 grams box of frozen cod fillets, exported all over Europe. Today, the 400 gram box contains loins free fillets, tails and bellies[5], which is through the manufacturing process two days after landing at the latest. Fresh fish trawlers land their catch after maximum five days at sea, and after an unloading for 4–5 hours, the fish is sorted after size and freshness (time elapsed since catch). After mechanically filleting and skinning, remaining blood, insides, skin and bone are manually removed. Then it is packed and frozen in boxes of 10 during a couple of hours, and stored locally. Sale is normally taken care of in advance. After a couple of days in local warehouses, it is thermo-transported to intermediate warehouses for large food retail chains (domestic or foreign), after which it finds its way to retailers' refrigerators.

Technology and structural changes in the fishing industry have, however, rendered an alternative supply chain structure for this industry. Trawlers with onboard freezing equipment, make six weeks fishing trips and land cod, frozen at sea, directly to processors or to freezing storage plants. From storage plants, batches of fish, sorted by species and size, are auctioned to the best paying customers. With this new supply chain actor, the first hand market of fish has become a global market place. Landed frozen fish is thawed and manufactured defrosted, a production process lasting one day longer than in the case of fresh fish.

Summing up, processing firms in both supply chains use multiple sourcing. However, since both supply chains are push oriented, the choice of suppliers do not restrict to price, quality and supplier service criteria. Since excess demand is in effect upstream the chain, due to substantial overcapacity in the processing industry, and floor prices are set by the fishermen's sales organisation, suppliers are more commonly chosen over a volume criterion. In most cases, however, choice of purchaser is more commonly made by suppliers, and not vice versa.

[4] In 2004, six dominating stockfish producers established a mutual export company, serving as a price guarantor for processors and to "speak with one voice" towards Italian importers. The co-operation was suspended in 2009, since members did not stick to agreed minimum prices; the curse of the cartel.

[5] In later years, the industry's emphasis has been on fresh, rather than frozen, fillets. Earlier, the whole fillet went to the 400 grams box. Today, however, this product is so price strained, due to foreign and offshore competition, that every measure is taken to direct the raw material to its best paid option. Now, the fillet is split into three products: loins, tails and belly flaps. The loin (the prime cut) is most important and best paid. Cod loins, from fish no older than four days, is marketed fresh, while older loins go to wet-pack or vacuum packed frozen products. Hence, the 400 grams box of frozen fillets is now a by-product. (Sogn-Grundvåg *et al.*, 2007)

Landing place choices are based on the prices and the service offered by the purchaser, given the mobility restrictions of the vessel, and the condition of the catch (preservation issues).

4.3. Comparison

When examining whether different supply chains the Norwegian fish processing industry operate in accordance with characteristics central to SCM, two challenges emerge: The severest is an operational one: To which degree are the supply chains in question managed according to SCM best practice principles, and how could this be determined? The second challenge arises since we address firms in the same supply chain, rather than individual firms.

In addition we need to translate the apothegms of SCM into activities and practices observed in the supply chains in question. We do so by following Storey *et al.*'s (2006) "ideals". In Table 2 each SCM "ideal" is listed (see Table 1), with scores for the two supply chains (stockfish and whitefish fillets, respectively). The scores are based on our experience based knowledge to each chain for each "ideal". Inspection of Table 2 reveals how the stockfish and whitefish fillet supply chains scores towards the ideally managed supply chain noted earlier.

Table 2. Agreement with ideally managed supply chains: Stockfish and whitefish fillet

Dimension/Ideal	Stockfish	Fillet	Dimension/Ideal (*cont.*)	Stockfish	Fillet
1. Seamless flow	No	Partly	6. Batch to sale	No	Yes
2. Pull oriented	No	Partly	7. Responsive	No	Partly
3. Info sharing	No	Yes	8. Lean/agile	Neither	(Lean)
4. Collaboration	No	Yes	9. Mass customized	Partly	No
5. IT enabled	No	Yes	10. Market segmented	Close	No

All in all, inspection of Table 2 reveals that the whitefish filleting branch is the one most in accordance with concurrent SCM principles. Our mapping show that the whitefish filleting supply chain is more in concordance with the "ideal" SCM characteristics on item 1 to 7 in Table 2, than the stockfish chain. One reason might be the untypical industrialisation process this branch has undergone – partly due to its political legitimacy – where the utilisation of modern technology has been central. Also, of the two supply chains addressed here, white fish filleting has suffered the most from the increased competitive pressure in recent decades. However, the white fish fillet supply chain also deviates from the idealised SCM principles.

4.4. SCM and performance

Despite the great focus on performance effects from SCM, few studies have examined performance effects empirically, especially when it comes to its impact on firm profitability. One reason is that there exists no unanimous agreement on how to measure and monitor supply chain performance. Otto & Kotzab (2003) suggest two possibilities: Either to measure if the firm makes profit from organising according to SCM principles, or to measure the achievement of a specific declared goal for which SCM is assumed a mean (like increasing supply security). We address the profitability of the SCM outcomes like Li *et al*. (2006), who found that SCM practice positively influences both level of competitive advantage and organisational performance. Vickery *et al*. (1999) found that volume flexibility was positively correlated with financial performance (ROI and ROS) in the highly cyclical furniture industry.

The average profitability in the fishing industry (i.e. the fishing fleet) has exceeded that of the fish processing industry since 1996. This is not surprising since fishing involves harvesting of a renewable resource, which, if managed properly, should acquire an economic rent. Parallel to the multiple sourcing of fish processing firms, fishing vessels have multiple buyers to their catch, dependent on price, species caught, catch area and season. Hence, the supplier base of a processing firm can consist of numerous vessels, just as the circle of customers. It is natural to measure supply chain profitability at the processing stage, since the main transformation process takes place there, "sandwiched" as it is between suppliers and customers.

The two different branches of the processing industry exhibit different levels of profitability. In Figure 1, the annually weighted average of return on investments and profit margin (ROI and PM) is displayed for the whitefish filleting and stockfish processors from 1995 to 2009. While profit margin depicts how much of sales that end up as profit to owners (and tax), return on investment allows for measuring profit against total productive capital employed.

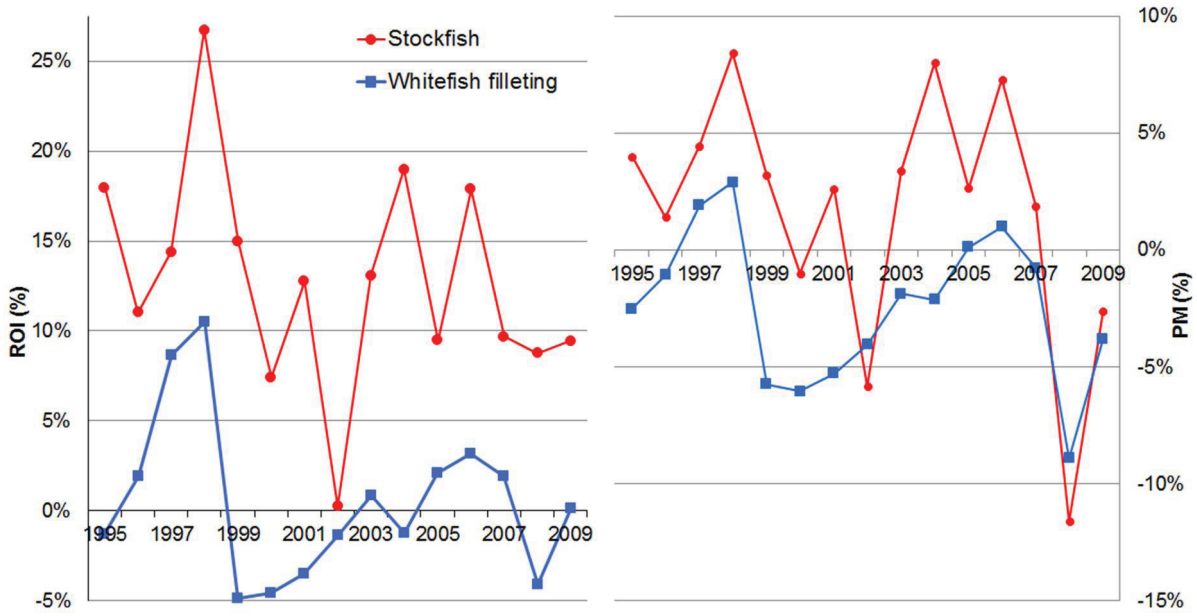

Figure 1. Return on investments (left) and profit margin (right) for whitefish filleting and stockfish firms in the period 1995–2009. Source: Bendiksen (2010)

Figure 1 shows that the stockfish processors have enjoyed better profitability than the white-fish filleting industry, both in terms of ROI and PM, in the period. Large inter-year variations take place, but obviously, stockfish firms have on average generated better results than white-fish filleting firms. As can also be seen, the financial crisis in 2008/2009 hit this industry hard. Together with exchange rate unrest, it hit the stockfish supply chain – with its import country among the PIIGS-states – the hardest. Anyhow, the finding is surprising, since it, from an SCM perspective, contradicts conventional recommendations.

We demonstrated above that the organization of the stockfish supply chain is inferior to that of whitefish filleting, as measured against the "ideals" from SCM. Here we find the SC best in accordance with SCM principles also to perform worst. Below we will shed some light over the puzzle between SCM principle adherence and the lack of profitability effects therefrom.

5. DISCUSSION

Interpreting the "negative" relation between adherence to SCM principles and performance is not straight forward. Especially so because firm performance is under influence of numerous factors (March & Sutton, 1997), where we have focused only on one: firms' compliance to central SCM practices. Also, firms might pursue a mix of performance goals (Galbraith & Schendel, 1987). Of course, SCM cannot be deemed unprofitable. Rather, what we witness might be what Williamson (2008: 13) describes as: "*...good theory (for one purpose) and good practice (for another) divide.*" Hence, alternative explanations to the differing profitability should be looked for elsewhere in the business landscape of our supply chains.

Our mapping shows that prevailing SCM principles are to a larger degree attended to in the whitefish filleting supply chain than the stockfish chain. Contradictory to literature prescriptions, our findings indicate that the stockfish supply chain displays greater long-term financial performance (i.e. competitive advantage) than the whitefish filleting supply chain, despite the fact that it exercise lower conformity with prescriptions from "ideal" SCM. To our knowledge, the only SCM research undertaken in a similar setting as our, is Hameri and Pálsson's (2003) study from the Icelandic fisheries industry[6]. They utilize a wider brush where they map the situation for the Icelandic seafood supply chain and point to its single largest challenge, which is to absorb the upstream raw material flow variations, since – after all – the demand for fresh, salted and frozen fish is relatively stable.

According to Chen *et al*. (2004) supply management contributes to enhanced financial performance for the buying firm, but is also important in fostering supply management capabilities, which may generate durable strategic advantage. In our setting the reasons why SCM compliance does not coincide with durable top-class financial performance are many. One is that gaining and sustaining competitive advantages requires more than a well-designed and managed supply chain. Firm size might also play a role. Here, we find the largest firms, in terms of both turnover and number of employees, within the whitefish filleting branch. According to Li *et al*. (2006) large organisations need more effective management of their supply chains, since their supply chain networks are more complex than those of their smaller competitors. For a supply chain designed for scale economies (hence, low unit costs), it might be unfair to be measured up against a flexible chain with seasonal production, serving a niche market, even though the supply side challenges are the same. Small firms in this uncertain supply side environment might have benefitted from capabilities emphasising flexibility, which have been harder to implement in larger organizations with higher capacity (minimum efficient scale) and corresponding cost penalties (Dreyer & Grønhaug, 2004; Vickery *et al*., 1999). The crucial issue is the supply side uncertainty, and, as noted by Ottesen & Grønhaug (2003), managers in the Norwegian fish processing industry devote most of their attention towards one specific part of the business environment – the input market.

Product characteristics and consumer demand also shed light on performance differences. Globalisation, competitive pressure and market fragmentation have hit whitefish filleting firms much severer than the stockfish supply chain. With its commodity-like product exposed to competition from other species and from other nations, the whitefish filleting branch is

[6] Otherwise, the closest to the fishing industry one comes in SCM literature, is the following analogy, given by a manager who explains how he manages his business relationship with suppliers (in Petersen, Handfield & Ragatz, 2005:372): *"Suppliers are like fish in the ocean. We (the buyers) are the fishermen.* (…) *There are several problems associated with fishing: How do we know we are using the right bait? How do we know the right kinds of fish are in the water? Most importantly; when we catch a fish, how do we know whether it is the right fish, and whether we should keep it or throw it back in the water? Finally, how do we know the fish will follow through with its commitments if we decide to keep it?"*

'stuck in the middle' with falling margins, due to increased competitive pressure in both input and output markets. On board freezing and sub-sequent warehousing opened the raw material market which caused localisation advantages to deteriorate. Due to this, Norwegian whitefish fillet producers found themselves in competition with Chinese firms[7] – producing the "same" product at lower labour costs – but also from less valuable species like Alaska Pollock, hake, pangasius, tilapia and blue whiting. Structural changes in this supply chain, with increased bargaining leverage at the retailers' stage, have also altered the business landscape in this supply chain immensely. The dynamic and rapid changes in the competitive environment led to eroding advantages for whitefish fillet processors (Sogn-Grundvåg *et al*., 2007). Even though premises were at place for near ideal SCM here, the possibilities for profitability levels above average became limited as time passed.

Norwegian stockfish has one major market (Italy), few substitutes exist, and processors are to a large degree insulated from competitive pressure as is the case for whitefish filleting firms. Instead of trying to control the uncertain supply environment in which fish processing firms are embedded, history and tradition have taught stockfish producers to adapt to the inherent uncertainty, and enabled them to respond in a flexible manner to supply uncertainty, since demand conditions have appeared to be relatively stable. For stockfish producers, weather and climate unpredictability also exacerbates uncertainty within the manufacturing process. In fact, this SC's adherence to the market segmentation and mass customisation principles is by and large caretaken by biology and weather conditions. Segmentation is mainly geographical, based on consumers' preferences. Processors, however, have little influence on the end product. After the fish is on the rack, weather does its trick and the grader decides the quality according to his best ability. Similarly the element of mass customisation follows the same pattern. This supply chain has also kept their localisation advantage despite vast structural changes in the fishing fleet, due due to their demand for large sized cod, which more or less is granted them as long as the fish migrate to Lofoten to spawn. Further, the demand side for stockfish is stable and Norwegian processors are by and large shielded from foreign competitors for this functional product. The product characteristics (with respect to shelf life and transport requirements) enables warehousing practically anywhere downstream the supply chain, which should favour SCM practices among chain participants. Such practices are, however, not implemented. One cause is that the struggle against uncertainty (i.e. implementing SCM) is time and resource consuming, and might produce a great deal of hassle (Mason-Jones & Towill, 2000) – a cost the small scaled stockfish producers are unwilling to bear all the time demand uncertainty is handled satisfactorily.

Supply side conditions are the largest obstacle for implementing effective SCM practices in our setting, but in literature, this side of the coin is often neglected as a problem for the supply chain. For instance, Mason-Jones & Towill (2000) ascertain that "... *the supply side and manufacturing process segments are essentially under the direct control of the business and may be tackled using principles such as lean thinking*" (p. 45). Further, Childerhouse & Towill (2004) assert that "... *supplier interface uncertainty results from non-compliance with our orders*" (p. 586). In the fish processing industry, this is clearly not the case. Orders for fish are only exceptionally placed, and the supplier interface is either near faceless; as in the case with frozen fish or pelagic fish auctions, or highly relational; as in the traditional long-term relationship between co-localised vessel owners and processors.

[7] The erection of cold storage plants and auctions was a blessing not only for the fishing fleet. Some branches grasped the opportunity of the detachment of catch areas and landing location on, and processing localisation. Hence, cold storage plants and has constituted an effective decoupling point for some industry participants.

If SCM literature is to address the challenges occurring in supply chains like these, the importance of emphasising the supply of fish as a "push" system, rather than the assumed demand driven "pull" system. Hence, theory prescriptions are only to a limited degree able to address the SCM challenges in our setting, since the demand driven paradigm is offset by the potential limitation that upstream supplies can be unavailable when needed from downstream demand. Hull (2005) gives several examples of supply chains in which the flow of goods and services is triggered by the supplier of the product, not the customer demands or demand forecasts. One of which are supply chains like ours, with perishable products and variable supply. In such supply chains, Hull acknowledges that: "*...customers' needs, while always important, are subordinated to the decisions and needs of the supply source*" (p. 219). This corresponds with Ottesen & Grønhaug's (2003) findings from the Norwegian fish processing industry, where the greatest attention of managers was directed towards the supply source.

Hull's (2005) treatment of supply driven chains are categorised within four major themes which all suit our cases. First, supply initiates the product flow, and operation interruptions must be recovered quickly to avoid significant delay penalties. Second, 'resilience' is needed to ensure the flow of supply. Alternative markets should be available if one fails, or price adjustments should be undertaken to encourage (or discourage) demand. Third, products are commodity-like since they are sold on price, and typically sold in multiple markets, towards the most profitable. Finally, customer services are mainly guided by price. In supply driven chains, the bullwhip effect is reversed, based as it is on the fear of demand limitations, whereas in demand driven chains it is based on the fear for supply limitations. In demand driven supply chains information sharing between chain participants is assumed to reduce the bullwhip effect. In supply driven chains, however, information sharing might increase the bullwhip effect since customers might claim price reductions if accruing knowledge on supply increases, reduced primary prices or operational efficiencies.

This could occur in our setting if for instance quotas or landings increase, ex-vessel prices fall or technological advantages take place in the manufacturing process. This situation occurred during the international financial crisis in 2008/2009, where a severe depreciation of the Icelandic currency, among other things, worsened terms of trade for Norwegian fish processors. As a consequence, Norwegian ex-vessel prices for cod fell by 30 per cent during the first half of 2009, while stockfish prices (to Italy) fell by 40 per cent from December 2008 to December 2009. Export prices for frozen cod fillets, which were more robust regarding number of markets, fell by 20 per cent during that year. As a consequence, the profitability in the white fish filleting supply chain was less affected than the stockfish supply chains in 2008/2009, as shown in Figure 1. For stockfish, industrial experience based knowledge exists, that if production and supplies to the Italian market exceeds approximately 3,000 tonnes annually, prices will fall leaving everyone worse off. With more accessible information, for instance by web-based solutions on ex-vessel prices and quantities, Italian importers are equipped with much better arguments in haggling over contractual terms and conditions.

As underlined by Vorst *et al.* (1998), the inherent uncertainty, which managers in this industry are facing, can only marginally be remedied by SCM. Hence, textbook ideals on SCM implementation must be fitted to the actual business environment by taking the contextual embeddedness into consideration. In our setting, uncertainty favours SCM, but SCM is solely inadequate to create and defend competitive advantages. Ellram (1991) claims that vertical integration can be seen as an alternative to SCM and Kouvelis & Milner (2002) assert that greater supply uncertainty increases the need for vertical integration. Here, the whitefish filleting sector has undertaken upstream vertical integration. However, this strategic grip gives no insurance against the unpredictability of nature. Instead, due to the seasonality of fisheries, fish processing firms invest in production capacity to attend to peaks of landings.

Despite the efforts to forward fish to areas with less supply, or selling the fish unprocessed, the result is nevertheless a substantial overcapacity in fish processing, leading to excess demand for catch and ex-vessel price press.

6. CONCLUSION

We have in our study analysed the conformity to SCM "ideals" within two supply chains, but performance effects are assessed at a specific stage of the supply chain. Since stockfish and whitefish filleting firms share the same supply base, and operate at coinciding links in the supply chain, their share of the "profit pool" should be comparable (Gadiesh & Gilbert, 1998). However, we cannot omit that a supply chains focus, when considering average performance, conceals well performing filleting firms and poor performing stockfish firms. Different firms in the two branches might also engage in supply chains deviating from the branch typology we have sketched: for instance stockfish producers exploiting underutilised capacity outside the main season, with greater product mix and diversity.

The challenges for successful implementation of SCM in this industry are to a large degree overcome in the supply chain of farmed salmon, where much of the inherent uncertainty is brought under control and administered in agreement with SCM principles – even though it seems to be supply driven. There, large batches of farmed fish are slaughtered, processed and sold with low unit costs. Farmed salmon is to a large degree exported unprocessed, and if a decoupling point exists, we find it abroad, where the final processing is undertaken in agreement with national or regional customer preferences (e.g. mass customisation). Also within traditional cod fisheries, small scale pilot tests are undertaken, where cod – also with potential quality deteriorations – is caught with gentle gears, kept in net cages and – in some cases – fed. Then, as market conditions peaks, it is slaughtered and processed under a value maximising objective. As underlined by Hameri & Pálsson (2003) this technological progress can, if materialised in a larger scale, enable the fish processing industry to "... *meet the requirements of customers and the objectives set for efficient supply chain management*" (p. 137) by balancing the mismatch between demand and a catch, caused by natural variations. However, we believe this to be an "*exotic pipe dream*" (Bates & Slack, 1998: 65) since the natural variations can only to a minor extent be foregone. The recent Norwegian experience with cod farming underlines this view, where most actors now are bankrupt as the market prices for cod fell far below the unit cost.

Correspondingly, to recommend one unique and blissful SCM strategy for the Norwegian fish processing industry would likely lead more firms worse than better off. Every single firm would probably be the one best to know how it should satisfy its customers – within the confines of the environment it operates. Nevertheless, lessons which can help the firm to take well informed decisions can be learnt from logistics, management, economics and sociology – without trying to force a scheme upon the firm, which once turned helpful for Toyota and other large powerful organisations. There is, however, no doubt that a proper focus on managing every step of the supply chain can turn out more effective than the strategy hitherto most often adopted in this industry – namely upstream vertical integration (Isaksen, Dreyer and Grønhaug, 2004). Two main challenges remain; to balance the needs of customers with the varying flow of inputs from suppliers, and to align the confliction goals of the supplier and processor regarding fish prices. This strategic window can be favourably exploited by focusing on the core competencies firms possess, mainly within processing know-how and detailed product market knowledge, valid for producers of both stockfish and whitefish fillets.

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Supply Chain Management under uncertain supply

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Abstract in English

This paper examine whether supply chain management (SCM) literature prescriptions yield better performance as advocated. Companies try to benefit from theoretical knowledge to improve their performance and thus enhance their possibilities to survive and prosper. To follow theoretical knowledge is not easy, since it is general in nature and supposed to be valid in multiple (all) cases. To be useful, however, it has to be adjusted to the actual, context-specific situation. This paper focuses on SCM prescriptions in existing literature, and examines them empirically in two supply chains in the Norwegian seafood industry, where uncertainty is highly present. The two chains differ substantially regarding the transformation and flow of goods and information. One chain deviates substantially from literature prescriptions. Opposite to expectations, performance for this supply chain is better than for the other chain which to a much larger extent follow literature prescriptions. The findings are discussed, and implications for theory and management highlighted.

Keywords: SCM ideals, supply uncertainty, performance

Sammendrag på norsk

Det er vanskelig å etterleve teorier, siden de av natur er generelle og ansett å være gyldige i mange, eller alle, tilfeller. For å øke teoriers anvendbarhet må de justeres til den aktuelle, kontekstspesifikke situasjon. I denne artikkelen belyses hvorvidt sentrale anbefalinger fra litteratur om forsyningskjedeledelse (SCM) kaster av seg. I artikkelen undersøkes to forsyningskjeder i norsk sjømatnæring karakterisert av stor usikkerhet i omgivelsene. De to forsyningskjedene – henholdsvis filet og tørrfisk fra torsk – er svært forskjellige med tanke på prosessering, vare- og informasjonsflyt. Tørrfiskkjeden avviker vesentlig fra SCM-litteraturens anbefalinger. Det til tross, så scorer den bedre på sentrale prestasjonsmål enn filetkjeden, som i større grad er i overensstemmelse med anbefalingene. Avslutningsvis diskuterer vi funnene våre og mulige implikasjoner for teori og ledelse.

Introduction

This paper addresses whether prescriptions from the supply chain management (SCM) literature yield better performance and enhance competitive advantage, as advocated by its proponents (e.g., Araujo *et al.*, 1999; Dyer & Singh, 1998; Lee, 2002). This is an important question because companies try to benefit from theoretical knowledge to improve their performance. We focus on established prescriptions for supply chain management (SCM) and examine whether these are applied in practice – and to what extent they improve performance. Two different supply chains operating in the same industry characterized by high levels of supply uncertainty is the empirical context for our study. In the next section, we review selected parts of the supply chain management literature of particular importance for our study. More specifically, we address how uncertainty is treated within SCM as well as within other management theories. We do so because SCM challenges are the greatest when supply uncertainty is substantial. We then present our research method and empirical setting, before a more detailed presentation of the two supply chains in question is given. Then we map how the two supply

chains adhere to central SCM-criteria, and report findings. Finally, we summarize, conclude and discuss implications.

Literature

In this section we first address and try to clarify the concept of "supply chain management" (SCM). This is necessary, because the concept is ambiguous, and some common understanding is needed. We also review some central aspects of this literature as a basis for our perspective and arguments. Based on an extensive literature review, Mentzer *et al.* (2001) conclude that more than 100 different definitions of SCM exist. Inspection of the various definitions reveals that they vary significantly, in both content and scope, and cover a great variety of organizational activities. However, most scholars agree that SCM involves

> *"…the integration of business processes from end users through original suppliers that provides products, services and information that add value to customers and stakeholders" (Lambert & Cooper, 2000: 66).*

This corresponds to the idea of the value system (Porter, 1985), where the traditional view of the company as a single entity is insufficient to explain competitive advantages. Rather, the focus should be on systems of companies conducting subsequent activities in order to fulfil consumers' demands – a predominant down-stream and market oriented view which has been criticised for neglecting the up-stream facets of the chain (Erevelles & Stevenson, 2006). According to Kopczak & Johnson (2003), the fundamental business problem from the viewpoint of the entire supply chain is to supply products that meet demand in a complex and uncertain world. SCM has adopted an efficiency view, where the primary goal is to increase productivity and reduce costs (Chandra & Kumar, 2000). A central theme emphasized in the SCM literature is that if every link in the supply chain focuses on a set of corresponding and compatible goals, and openly shares information, redundant and duplicated efforts can be reduced (Spekman *et al.,* 1998). Prescriptions emphasize the need to manage relationships, including information and material flows across companies, to cut costs and enhance the flow of goods (Hutt & Speh, 2004) in order to increase customer satisfaction. Within this holistic perspective, the entity is presumed to be larger than the sum of its parts.

The lion's share of empirical studies on SCM is conducted in environments where the supply situation is relatively stable. As uncertainty increases, challenges in managing the supply chain also increase, and co-ordinating tasks becomes more complex. Some tasks are, however, more important than others for supply chain performance, and therefore more prominent in theoretical discussions. Table 1 presents the fundamental characteristics of the ideally managed supply chain, according to Storey *et al.* (2006)[i].

All the portrayed "*characteristics underpinning the ideally managed supply chain*" (op. cit.: 760) in Table 1 focus on effectiveness and the need for mitigating uncertainties in the supply chain. Environmental fluctuations impose uncertainties on organizations, to which they try to adapt, and:

> *"organizations will seek to buffer environmental influences surrounding their technical cores[ii] with input and output components. To maximize productivity of a manufacturing technology, the technical core must be able to operate as if the market will absorb the single kind of output at a continuous rate, and as if inputs flowed continuously, at a steady rate and with specified quality. Conceivably, both sets of conditions could occur; realistically they do not. But organizations reveal a variety of devices for approximating these 'as if' assumptions, with input and output components meeting fluctuating environments and converting them into steady conditions for the technical core." (Thompson, 1967: 20).*

Table 1 Idealised SCM characteristics. Source: Storey et al. (2006)

1	Seamless flow from initial source to end consumer with few interruptions
2	Demand-driven supply. Only demanded goods are produced (sell one/make one) with continuous stock monitoring. In optimum no inventories
3	Shared information throughout the chain. Everyone knows what goes in/out
4	Collaboration and partnership create win-win situations. All benefit from mutual gains
5	The supply chain is IT-enabled and IT-supported
6	Batches are configured to the rate of sale
7	Customer responsiveness. Flexible and reacts quickly to preference changes
8	Agile and lean
9	Mass customization (large scale customization at a mass-product price)
10	Market segmentation – by identifying main customers and customer groups

The items in Table 1 represent ways to isolate the supply chain's technical cores from environmental uncertainty. Under fully predictable supply and demand conditions, implementing such principles would be redundant, since production is levelled according to accurate forecasts.

SCM has been criticized for its metaphoric nature and lack of guidelines for practical applications. This makes the correspondence between theoretical prescriptions and real-life approaches hard to capture, and proper operationalization of theoretical concepts is necessary. In the below sections, the challenges to SCM imposed by uncertainty are addressed. But first, some theoretical approaches to uncertainty in the management literature are presented. Emphasis is put on the organizational choice between market and hierarchy, between which supply chains reside (Ketchen & Giunipero, 2004).

Uncertainty

Uncertainty is the discrepancy between current and needed information in order to carry out necessary duties (Galbraith, 1973), and – according to Coase (1937) – without uncertainty, firms would probably not exist. Uncertainty refers to environmental disturbances of a stochastic nature, with which a firm is confronted throughout the life-span of a contract or a bilateral exchange relationship (Mahoney, 1992). Uncertainty can take many forms. Sutcliffe and Zaheer (1998) distinguish between *primary* uncertainty (arising from exogenous sources), *competitive* uncertainty (actions from actual or potential competitors) and *supplier* uncertainty (strategic action from exchange partner firm). In the face of uncertainty, organizations can either adapt to it or take proactive counteraction to reduce it.

How uncertainty is treated in strategic management literature is dependent on perspective. Three prominent views will be briefly discussed here: transaction cost economics (TCE), industrial organization (IO) and the resource-based view of the firm (RBV). These are all influential in addressing vertical integration and contractual relationships, which, according to Ellram (1991: 14)[iii], are:

> *"…the methods of competitively organising that come closest to the concept of supply chain management".*

Hence, an equality sign between the two and SCM is drawn.

Transaction costs are the costs of using the price mechanism (Coase, 1937), and transactions with business partners become hazardous when recurring exchanges involve transaction-specific investments and information is incomplete. The features influencing the level of transaction costs are

> *"…asset specificity (especially) and information impactedness, opportunism and*

> *bounded rationality, uncertainty and small numbers bargaining, together with frequency" (Williamson, 1983).*

When transaction costs are high (i.e. when exchanges recur frequently, require specific investments, potential exchange partners are few, and/or outcomes are highly uncertain), they are best performed within a hierarchy (within the firm), as this means information transfer is eased, opportunism is discouraged and conflicts can be resolved by authority. Uncertainty in the transaction environment complicates contractual governance (i.e. market exchanges), because managers are boundedly rational. Hence, according to TCE, uncertainty should lead to higher levels of vertical integration, or SCM (Ellram, 1991).

While TCE focuses on economic efficiency as a means to achieve competitive advantage (perform better and out survive those who do not act in accordance with TCE principles), the IO view is to

> *"…to shield the firm, to the maximum extent legally possible, from competitive forces" (Teece, 1984: 4).*

In IO, industry—not transactions—is the unit of analysis; industry characteristics determine the sources of profitability and the company's position in the industry (i.e. the structure-conduct-performance paradigm). Porter (1980) turns this focus around, from what imperfect competitors should *not* do, to what the smart manager should do, in order to curtail competitive rivalry, by low cost, differentiation or market power advantage. According to Ellram (1991), vertical integration can be viewed as an alternative to SCM, as it attempts to manage channel efficiency. Within this stream of research, uncertainty influences the make-or-buy decision (or SCM level) in different ways, and recommendations are unambiguous. First, uncertainty can be used strategically by industry incumbents, to create entry barriers for potential entrants lacking established market knowledge (Sheperd, 1997). With input supply uncertainty regarding price and quality, upstream vertical integration can help the company forecast input prices and establish the best input mix. With uncertainty regarding demand, less vertical integration is preferable. Harrigan (1983) recommends low levels of vertical integration in the face of demand uncertainty or technological uncertainty.

Finally, RBV literature accentuates *resource heterogeneity* and *immobility* (i.e. input market imperfections) as the sources of competitive advantages for firms, opposite to the IO perspective where these are accrued through product market imperfections (Barney, 1986; Wernerfelt, 1984). Some of the resources held by firms are either costly to duplicate or inelastic in supply. Exploiting and internalizing such resources can bring about economic rents above average. Vertical integration, or the way companies organize their supply chain, can be a way of creating valuable and rare resource combinations that are difficult to imitate. No rule of thumb exists for when to integrate vertically, but efficient company boundaries should follow a comparison of the relative strength of internal and external capabilities (Langlois, 1997). Where TCE explains the existence of the firm by analysing market failure and its influence on efficiency (and thereby also managerial hierarchy), RBV tries to answer *why* firms differ by underlining the smart response to market failure. Also, in this approach, uncertainty has no clear effect on vertical integration. Barney (2002) argues that when uncertainty is associated with unanticipated sources of opportunism in an exchange, vertical integration is an appropriate way to avoid it. If uncertainty is associated with the future value of an investment, flexibility becomes more important, and less hierarchical governance is preferable. Market uncertainty makes it difficult to decide which capabilities will lead to long-term success. Consequently, flexibility should be nurtured in order to enable quick responses in developing the necessary capabilities once uncertainty has been resolved.

Management theory offers a large number of recommendations regarding the best strategic countermeasures companies have at their disposal in the presence of uncertainty in their surroundings. The nature of the uncertainty determines which countermeasure to employ, but even within the same perspective, advices seem

to differ. Below, the treatment of uncertainty within SCM is briefly presented.

SCM and uncertainty

In the SCM literature, uncertainty is dealt with in different ways. At the core of logistics is the imperative that all supply chain processes (from raw material to the customer) should add value to the product. If added resources do not contribute to enhance the end product's value, it is waste, and should be eliminated. In a "one sold, one made" perspective, inventories are the most obvious case of waste. When embedded in an uncertain environment, uncertainty will propagate through the entire supply chain system and complicate SCM (Davis, 1993). Uncertainties, occurring between stages in the chain, are most often assured against by using inventories, i.e. "*protection against life in an uncertain world*" (ibid., p. 38), or providing excess capacity (van der Vorst *et al.,* 1998). Buffers, in *time*, *capacity* or *inventory* – to cope with uncertainty – lead to inefficient processing and non-value activities (van der Vorst & Beulens, 2002).

One of the most influential approaches to uncertainty in the SCM literature comes from Fisher (1997). In his framework, the product type is crucial for the choice of supply chain, and the variation in level of uncertainty surrounding the demand for the product yields different supply chain design. He distinguishes between "functional" and "innovative" products: By "functional", Fisher means products that satisfy basic needs, have long life cycles and enjoy a stable, predictable demand, while "innovative" products have short life cycles, exhibit great product variety, and meet unstable, unpredictable demand in their markets. According to Fisher, supply chains should focus on efficiency to minimize the costs of functional products. For innovative products, supply chains should be designed for responsiveness to avoid expensive market mismatches. Fisher's emphasis on market responsiveness and physical efficiency is similar to Christopher's (2000) distinction between the leanness and agility: where *leanness* suits high volumes, homogenous products with predictable demand like commodities, *agility* suits low volumes, differentiated products with high demand variability. Stable demand allows for a focus on efficiency and low cost. Volatility in demand for innovative products entails a greater risk on the part of producers in terms of shortage or excess supply. This risk is escalated by shorter product life cycles, which favour a market-responsive supply chain.

Lee (2002) elaborates on Fisher's discussion of uncertainty by also including disturbances on the *supply side* of the manufacturing process. He distinguishes between stable and evolving supply conditions:

> *"A 'stable' supply process is one where the manufacturing process and the underlying technology are mature and the supply base is well established. An 'evolving' supply process is where the manufacturing process and the underlying technology are still under early development and are rapidly changing, and as a result the supply base may be limited in both size and experience." (p. 107).*

Lee acknowledges that food products might have a stable demand but a highly variable supply side, as quantity and quality are dependent on weather conditions: a situation suitable for our setting. Based on product type (functional or innovative) and supply conditions (stable or evolving), he prescribes four distinct types of supply chain strategies for reducing uncertainties on the supply and/or demand side. One of these strategies is a risk hedging strategy, appropriate for functional products in evolving supply processes. Inventories are then pooled and resources shared among supply chain participants, which shields individual actors against the risks associated with supply disruptions by sharing safety stocks with other actors. Inventory pools decouple the supply chain effectively, and, for downstream companies, multiple supply bases safeguard backup supply.

Mason-Jones *et al.* (2000) combine leanness and agility in the same supply chain, as an equivalent, yet opposite, approach. In their hybrid strategy, "leanness" is retained upstream of a determined *decoupling point*[iv], while processes downstream of this point focus on flexibility (agility). This strategy is in their view better able

to ensure best practice SCM when early supply chain stages are relatively stable, while end-markets are calling for increased attention.

Supply chain managers are vulnerable to many different forms of uncertainty, and the need for SCM is related to the development of the competitive business landscape in the late 1980s and early 1990s (see e.g. Ellram, 1991; Hutt & Speh, 2004). Globalization, market deregulation and technological progress have created greater competitive pressure, both within and between nations. However, no general SCM prescriptions exist for how to diagnose and take action against contingencies, and managers' perceptions of uncertainties might vary significantly. In the following section, we present some specific contingencies in our chosen setting, which create uncertainty and deserve managers' attention when supply is virtually stochastic.

Research method and industry-specific challenges

This section describes how we examine our research question empirically, i.e. to which degree supply chains in our industry subscribe to SCM practices, and if they reap the prescribed benefits therefrom. The industry consists of approx. 500 companies in 11 different industry segments – defined by the main products they bring to the market. We focus on two distinct supply chains, the stockfish segment and the whitefish fillet segment. Common to both supply chains are substantial uncertainty related to input supply. The two different supply chains was chose for this study because they cope with supply uncertainty in different ways. Thus, we obtain variation on how these chains are managed at the same time as undesired variations in industry conditions is kept at a minimum. In this way, "industry effects" caused by cross-industry differences are unlikely to influence the results.

The main data source is the annual profitability study of the fish processing industry (Bendiksen, 2010). For more than 40 years, the Norwegian fish processing industry have been mapped regarding its profitability, flow of input and products, structure and markets at our institute, which have brought about expert knowledge on this industry. In addition, we have carried out commissioned research for the industry, industry organizations and authorities in the same period. For this specific analysis, general managers in two companies in each supply chain were interviewed on issues regarding the production process – from inputs to markets. Methodically, we compare the two supply chains by contrasting them with the criteria for the ideal SCM practice, derived from the research literature (cf. Table 1). The outcome of this comparison is highlighted and explained. In addition, we report how the two supply chains score on performance indicators, in order to map how their SCM-adherence meets the main goal for SCM:

> *"…to maximize profit through enhanced competitiveness in the final market" (Waters, 2007: 24),*

and whether SCs by their SCM practice achieves a competitive advantage.

We have concentrated on the two supply chains to capture how companies make different adaptations in this industry environment. Both segments share the same supply base, and in many instances they are served by the same raw material vendors: fishing vessels of different sizes using different gears, from small coastal vessels fishing with hand lines to large ocean trawlers. Different vessels catch different types of fish, and different gears usually catch fish of different sizes. The quality of the catch varies with season, gear and onboard handling. Once quality losses occur, it cannot be recovered at later stages in the supply chain.

The most important whitefish species are cod, haddock and saithe. The Northeast Arctic cod is the most important species, for fishermen as well as processors, both in terms of catch value and volume. Biological features, such as migration patterns, weather conditions and abundancy, create a seasonal supply with a high degree of variability. For cod, this presents itself in the seasonality of the two main fisheries. First, from their normal habitat in the Barents

Sea, mature cod migrate to the coast of Northern Norway (mainly Lofoten) to spawn in the period between February and April. Second, younger year classes of cod – feeding on capelin – follow the capelin on its way to spawn along the coast of Finnmark in the period between March and May. These periods are the two main seasons for coastal vessels. Where vessels in the Lofoten fishery bring ashore large-sized cod of great quality and value, the landings from the Finnmark fishery bring cod that is smaller in size, with potential quality weaknesses. Larger vessels (like trawlers) are less dependent on weather in their operation, usually fish far off shore and catch fish of smaller size, with less seasonal variation.

Fishing is a highly regulated activity, and authorities impose both input and output regulations on the fishing industry. Following advice from the International Council for the Exploration of the Sea (ICES) and bi- and multilateral negotiations, the Government allocates Norwegian quotas to fishermen. In addition, the value chain link between the fishing and fish processing industries in Norway is highly regulated. One example is that only registered fishermen are allowed to own and operate registered fishing vessels, leaving fish processing companies excluded from upstream vertical integration. However, some exemptions have been granted (Hermansen *et al.,* 2012), and today, most cod trawlers are owned by whitefish filleting companies. Integration towards other parts of the fishing fleet is virtually non-existent. In addition, sales organizations collectively owned by fishermen, have legislative monopoly rights to attend all first-hand sales of fish. These sales organizations can also unilaterally determine minimum prices for fish, though in practice, prices are determined following negotiations with fish processing company associations. Furthermore, fish processing companies are prevented from purchasing the 'most desirable' parts of the catch from vessels, and must buy the whole catch from each vessel. Fish auctions are an exception, where fish frozen at sea is sold in homogeneous batches regarding species and fish sizes. Usually, fishermen also catch several bycatch species, even when targeting only one.

The raw material vendors, providing the fish processing industry with its most important input, are subject to many and, in part, very stringent regulations, due to the restrictions imposed on actors. Catch quotas and fish stock composition fluctuate from year to year, and variations in weather conditions, abundance and availability lead to catch variations from month to month, week to week and day to day. The supply of fish is thus associated with great uncertainty, both with regard to landing volume, quality, and the species and size of fish supplied. Hence, Burt & Pinkerton's (2003) definition of procurement as:

> *"…the systematic process of deciding what, when, and how much to purchase; (…) and the process of ensuring that what is required is received on time in the quantity and quality specified"*

becomes an ideal, far from the reality perceived by managers of fish processing companies. Rather, in supply chains for fresh food, as in the present case, adequate supply is seldom provided by stand-alone companies, due to perishability and shelf life constraints (van der Vorst & Beulens, 2002).

Perishability creates uncertainty in food supply chains (Georgiadis *et al.,* 2005; Hobbs & Young, 2000; van der Vorst *et al.*, 2001), and fish is a highly perishable asset. The species available in Norway, where the natural habitats of the fish entail sea temperatures well below 10°C, are even more perishable than agricultural products, because the natural bacterial flora of these fish is not curtailed by product cooling in the range of 2–6°C, which is the regular temperature in retailer display counters for fresh products. Suppliers counter this uncertainty by locating a buyer fast, as the fish cannot endure long breaks on its journey to the market. In many cases, warehousing products hoping for improved market possibilities is not an option for suppliers.

Vorst *et al.* (1998) identify inherent uncertainty as especially present in food supply chains, and this uncertainty is related to natural variations in quality, seasonal patterns, weather and biology. In the industry addressed here,

supply management becomes a critical task. The nature of the supply uncertainty faced by fish processing companies differs from the supply uncertainty typically described in SCM literature. Davis' (1993) defines supply uncertainty as

> *"…[relating] to the unpredictable nature of the quantity, quality and timing of supply, which can occur due to (1) various manufacturing or logistical problems, (2) unresponsiveness to change in volume or product specification and (3) opportunistic behaviour."*

No doubt, managers of fish processing companies struggle against the quantity, quality and timing of supply on a daily basis. The problems are, however, neither due to manufacturing or logistical problems (in a narrow sense) nor the unresponsiveness or opportunistic behaviour of suppliers. Without rejecting these arguments as uncertainty sources, the major cause of uncertainty demanding manager attention in this industry is the harvesting and supply of a biological resource, where variations in weather, abundancy and composition makes timing, quality and quantity of supply virtually stochastic. These sources of uncertainty can only to a limited degree be remedied by strategic purchasing, long-term relationships, inter-company communication, cross-organizational teams and supplier integration (Paulraj & Chen, 2007). The only way to reduce this kind of uncertainty through SCM is to increase the exchange of information up- and downstream the chain, and by adopting safeguarding procedures.

Seasonality, created by the biological nature of this raw material, imposes high levels of uncertainty in the factor market and reduces predictability in the whole supply chain. In some central fish markets, consumption is also seasonal. For instance, in Brazil, one of Norway's most important markets for clipfish (i.e. salted and dried fish), roughly 80 percent is sold and consumed during the Christmas and Easter holidays. This underlines the severity of the bullwhip effect in this supply chain, where demand variability in end markets seems to have a self-reinforcing effect on inventories further up the supply chain. Taylor & Fearne (2006: 379) address this challenge facing food supply chains, caused, in part, by the mature and highly competitive food retail market, in the following manner:

> *"…fragmentation and commodity culture invariably leaves primary producers at the end of a long bullwhip, struggling with the significant challenge of balancing inherent uncertainty in supply with growing uncertainty in demand."*

Another feature of the Norwegian fisheries industry is its strong export orientation, where estimates of the export share is in the range of 90-98 per cent. Most of the industry actors – from raw material vendors to exporters – are small- and medium-sized enterprises (SMEs), and limited co-operation between them exist. Hence, in facing international food producers or global retail chains with great purchasing and bargaining power, one can easily imagine the "terms of trade" being forced upon them, being 'order takers' instead of 'order makers' (Holter *et al.*, 2008). The global market for whitefish is regarded as both highly competitive and uncertain (Haugland & Grønhaug, 1996), and Norwegian whitefish export is organized as a typical "middleman's business", similar to commodity markets, where

> *"…transactions follow a repetitive pattern, with both exporters and importers having their regular trading partners" (Dulsrud & Grønhaug, 2007: 11).*

Since few quality standards exist for these products and product quality is dependent on mode of transport, the exporter usually has more information regarding product conditions than the importer, who often is unable to ascertain product quality until after delivery. In this context, trust between sellers and buyers is crucial; written documentation is scarce and few transactions follow formal contracts. Reneging is rare, but would have immense financial consequences for the seller, as would complaints and returns. Unlike the organization within the agri-food business in Norway (where farmers hold

proprietary interests in the entire chain, products are sold almost exclusively on the domestic market only and prices are set unilaterally in co-operation with the government), fishermen and fish processors have – despite their mutual dependency – opposing interests when it comes to the price of the raw material: what is the sole source of income for fishermen is the highest cost component for fish processors, who compete in an international market place. Consequently, the strategic uncertainty is considerably higher in fish supply chains.

Fish product supply chains are characterized as push, rather than pull, systems. Traditionally, the Norwegian fisheries industry is characterized as volume-oriented, where target figures are related to production yields, batch sizes, and inventories rather than balancing production with consumer demands. The development in food supply chains in recent decades has been one where power has shifted from manufacturers to groups of retailers. This has, in turn, rendered food products as "*…functional products with volatile and unpredictable demand*", as "*retailers set the prices and demand frequent and responsive deliveries on short notice*" (van der Vorst *et al.,* 2001: 74). In our analysis, the total supply chain is taken into account, but the emphasis is placed on the supply side—an environment shared by almost all aspects of the Norwegian fish processing industry. This is also the business area that deserves the most attention from managers in this industry (Ottesen & Grønhaug, 2002; 2003), where purchasing is not only an integral part of running the company (Gadde & Håkansson, 2001) but one of the most important ones.

Fish supply chains have distinct features in common with other food supply chains, like the perishability of products, the seasonality of supply and, in some cases, the need for an uninterrupted chilling/freezing chain from harvest/processing to the retailer (asset specificity). However, in some respects, the seafood supply chain (based on wild fish, as opposed to aquaculture) differs considerably from other food supply chains – mainly due to the lack of control up-stream in the chain. Harvesting is subject to great uncertainty created by nature – particularly weather conditions and biological factors. But where the farmer can sow his cultivated soil in the spring and, with a relatively high degree of certainty, plan his harvest in the summer/autumn, the fisherman has no influence on the harvest in the season to come, other than to keep his gear and vessel in good condition and being ready to put in the effort necessary when possibilities turn up. If measured from spawning to catch, production cycles are much longer in fisheries than in agriculture. Furthermore, it is out of harvesters' control, which makes it difficult to implement health and safety, traceability and animal welfare standards. Also, the fluctuations experienced in fisheries are higher than those seen in agriculture[v]. Both chains deal with regional and seasonal variations in supply, but there is a greater level of uncertainty regarding the fish harvest, because abundancy and availability plays a greater role. In fact, typically 25 percent of the cod is landed in March alone, and 50–60 percent is landed in in the period between February and April every year, greatly affecting the industry's capacity utilization.

Above, we have argued that the setting under scrutiny is one where considerable uncertainty is present. In the next section, we will address the challenges this creates for supply chain management in this business environment, and how two different supply chains perform – using different strategies in order to survive and prosper.

Findings

The two selected supply chains in the Norwegian fish processing industry are the stockfish and the whitefish fillet supply chains. Our predominant focus on the up-stream part of the supply chain contributes to level the prevailing down-stream orientation in SCM literature (Erevelles & Stevenson, 2006). Common to both supply chains are the supply challenges noted above, and they represent different approaches to the uncertainty in the supply environment. Both chains are defined by the main product they bring to market, as recommended by New (1997). In the view of central SCM practices, they are dissimilar in many respects, as will be made clear from the discussion to follow. First,

however, the two seafood supply chains are briefly described with respect to the main transformation and logistic processes[vi] that take place from raw material to consumable products.

The stockfish supply chain

Within the fish processing industry, we find 26 companies who mainly produce stockfish, all located in Lofoten, with a total turnover of NOK 651 million and an employment of approx. 194 man-years in 2009. Drying is the oldest kind of fish preservation in Norway, with traditions going back as far as the Viking era, and stockfish is probably the oldest Norwegian export product. The largest market for stockfish is Italy, who receives the best, most valuable stockfish, made from cod. Stockfish is also exported to other nations, especially Nigeria and Croatia. Here, the stockfish supply channel is described for export to Italy, the single most important market, which takes about 85 percent of the Lofoten-dried cod.

The fish is caught outside Lofoten, mainly with size-selective gears (e.g. gill-nets), in March. The fish is normally stored on-board no longer than 6–10 hours before it is landed (headed and gutted) to processors. There, the fish is rinsed, the fish is tied together in pairs by the tails, and then hung on drying racks, where it is left to dry from early March until mid-June, when it is taken inside for subsequent drying. From August, professional graders sort the fish into 17 different qualities, before it is pressed together in batches of 25–50 kilos and sewn into gunnysacks, ready for export. Most of the production is sold during the autumn. Some is also sold in the spring, but the end-product can be stored for up to a year. When exporting the stockfish, most producers use agents as middlemen, but some export on their own and represent themselves in meetings with importers.[vii] Stockfish is a very expensive product and possible deterioration is often not discovered until the product reaches the "soaker". There, the fish is soaked in water for approx. 10 days, until it reaches about the same weight as before drying. After this, it is sent to retailers or restaurants. Italy is actually comprised of five different regional markets, with regional variations in how stockfish is preferred and prepared.

The whitefish filleting supply chain

In 2009, there were 9 active whitefish filleting processors in Norway, all but one located in Northern Norway. They had a turnover of NOK 1,537 million and an employment equivalent to 720 man-years. In 1999, the number of companies was 19, turnover NOK 2,038 million and employment at 1,530 man-years. This industry segment has played an immense role as the main employer, and/or sole recipient of fish, in many coastal communities. Due to their importance as local employers and their need for raw material input, these companies have often been granted permission to own large fresh-fish trawlers that could ensure a continuous supply. Even though many of these companies have a trawler fleet serving them with much of their needed input, they also purchase fish from other, smaller vessels.

We concentrate our discussion on the most important product from this supply chain: the 400-gram box of frozen cod fillets, exported all over Europe. Today, the 400-gram box contains loin-free fillets, tails and bellies[viii], which have completed the manufacturing process no more than two days after landing. Fresh fish trawlers land their catch after maximum five days at sea, and after the unloading process, which takes 4-5 hours, the fish is sorted according to size and freshness (time elapsed since catch). After mechanically filleting and skinning the fish, the remaining blood, innards, skin and bone are manually removed. The fish is then packed and frozen in boxes of 10 in a couple of hours, and stored locally. Sale is normally pre-arranged. After a couple of days in local warehouses, refrigerated transport takes the fish to the intermediate warehouses of large food retail chains (domestic or foreign), after which it finds its way to retailers.

Technology and structural changes in the fishing industry have, however, produced an alternative supply chain structure for this industry. Trawlers with onboard freezing equipment, make six weeks fishing trips and land cod, frozen

at sea, directly to processors or to freezing storage plants. From storage plants, batches of fish, sorted by species and size, are auctioned off to the best-paying customers. With this new supply chain actor, the first-hand market for fish has gone global. Landed frozen fish is thawed and manufactured defrosted, a production process lasting only one day longer than what is the case for fresh fish.

In summary, processing companies in both supply chains use multiple sourcing. However, as both supply chains are push-oriented, the choice of suppliers is not restricted to price, quality and supplier service criteria. Processing firms are said to prefer volume over quality when "selecting" suppliers, in order to reduce transaction costs due to a substantial overcapacity in the industry and floor prices set by the Fishermen's Sales Organization. In most cases, however, it is the supplier who chooses whom to sell to, and not vice versa. Landing place choices are based on the prices and the service offered by the buyer, and mobility restrictions of the vessel and the condition of the catch (preservation issues) are also taken into account.

Comparison

When examining whether different supply chains in the Norwegian fish processing industry operate in accordance with characteristics central to SCM, two challenges emerge: The most severe is an operational one: To which degree are the supply chains in question managed according to SCM best practice principles, and how can this be determined? The second challenge arises from our addressing a collection of firms belonging to the same supply chain (as level of analysis), rather than individual firms. In most empirical SCM-studies, individual companies are studied (Vallet-Bellmunt *et al.,* 2011).

In addition, we need to translate the "wise words" of SCM into activities and practices observed in the supply chains in question. We do so by following Storey *et al.'s* (2006) "ideals". In Table 2, each SCM "ideal" is listed (see Table 1), with scores for the two supply chains (stockfish and whitefish fillets, respectively). The scores are based on our experience-based knowledge of each chain for each "ideal". An inspection of Table 2 reveals how the stockfish and whitefish fillet supply chains score against the ideally managed supply chain, noted earlier.

Table 2 Agreement with "ideal" SCM: Stockfish and whitefish fillet

Dimension/Ideal	Stockfish	Fillet	Dimension/Ideal (*cont.*)	Stockfish	Fillet
1. Seamless flow	No	Partly	6. Batch to sale	No	Yes
2. Pull oriented	No	Partly	7. Responsive	No	Partly
3. Info sharing	No	Yes	8. Lean/agile	Neither	(Lean)
4. Collaboration	No	Yes	9. Mass-customized	Partly	No
5. IT enabled	No	Yes	10. Market segmented	Close	No

In Table 2, the two supply chains have been mapped, and scores have been assigned according to how well they suit the "ideals" of supply chain management (cf. Storey *et al.,* 2006). Below, a more detailed reasoning for the scores is given, corresponding to the numerical order of arguments in Table 2:

1

A *seamless flow of goods* can be interpreted as the smallest possible number of stops the product makes on its way from raw material to consumer (raw material warehousing, work in progress, stock of finished goods, etc.) and that the stops products necessarily have to make have the shortest possible duration. Obviously, from the descriptions of the whitefish fillet and stockfish supply chains, we see that the first is closer to a seamless flow than the latter, merely by looking at the production process and the lead time from raw material to finished product.

2

None of the chains is strictly *pull-oriented*, as production is not initiated by individual customer orders. Rather, both chains are supply – or push – oriented. However, the whitefish filleting supply chain is better configured (flexible, with respect to time constraints) to attend to customer demands. This is partly because companies in this chain are vertically integrated towards the suppliers. However, the ability of pulling through demand entirely in this chain is only possible to a limited degree: Despite having ownership in large trawlers, it is not possible for processors to entirely hedge against uncertainties regarding time of delivery, the size and quality of the fish and the composition of the catch. The manufacturing link of the chain has emerged as a good candidate for a decoupling point (cf. Lee, 2002; Mason-Jones *et al.,* 2000); upstream of this, an efficient physical flow is impeded, or even impossible.

3/4

Information sharing and *collaboration* throughout the supply chain is better supported in the whitefish filleting supply chain than in the stockfish chain. This is not only because companies in this chain are relatively big and many of them are under joint ownership (as opposed to the small, stand-alone stockfish companies), but also because the level of vertical integration – both up- and downstream the value chain – is high. Upstream vertical integration, towards the fishing fleet, represents a potential for the manufacturer to obtain the raw materials he needs on a timelier basis. It also enables greater information sharing by way of a closer collaboration throughout the chain.

5

The whitefish fillet supply chain also makes more use of modern *information technology* than the stockfish chain. Suppliers (trawlers) and manufacturers collaborate in order to provide raw material for production, in a timely manner and – to some degree – the species and sizes needed for production. Automation of the production and distribution systems relies heavily on IT-enabled systems, tracking weight and temperature from vessel to retailers. IT has been implemented in the stock fish companies too, but to a lesser degree throughout the chain than between supply chain members and outside service providers (customs, sales organizations, etc.).

6

"*Batch to sale*" configuration of products and production is much higher in the whitefish filleting companies than the stockfish companies. The 400-gram fillet box found in supermarkets is identical to what is sent out from the filleting company. When purchasing stockfish in Italy for home cooking, it is rarely found in supermarkets and, if it is, it is hardly ever displayed on a shelf together with other staple products. Consequently, while product design and packing is essential for filleting companies, it is almost absent in the stockfish chain.

7

The organization of the whitefish filleting chain is much more *customer responsive* than that of the stockfish supply chain. Vertical (and horizontal) integration supports collaboration and information sharing in the fillet chain, where information on changes in end-demand is propagated backwards down the flow of goods. This enables a more customer-responsive effort from chain members.

8

When addressing whether the supply chain type is *lean* or *agile* (or a combination) the adequate point of departure is the type of good brought forward to the market. In our chosen setting, both products are mature products with limited elements of product innovation. Fillets are commodity-like: sold in high volumes, with modest profit margins and forwarded by a chain focusing on efficiency. In contrast, the stockfish supply chain mainly addresses niche-markets, where demand is relatively stable and profit margins largely depend on total quantity supplied and end-product quality (which is unobservable up front). The total production volume is endeavoured balanced with final demand. The main difference between the two products

is perhaps the complexity of the end product. Fillets are relatively simple, and inherent product characteristics can in many instances be handled by technology instead of craftsmanship. The labour intensity involved in production has led to production relocation to sites in low-cost countries and a global division of labour. Stockfish, on the other hand, represents a more complex product. Even though the production technology is fairly simple, the outcome is both geographically determined (site specificity) and processes depend on tacit knowledge. The end product is affected by the climate during the lengthy processing period, and must satisfy different preferences in different regional markets, where product quality is finally established. There, products are customized, close to the retail outlets and the consumer. For fillets, similar products are offered to most markets, where product attributes are equal to all customers in multi-national markets, except from the packaging, which is differentiated based on the language of the customers. In this respect, we deem the fillet supply chain to be relevant for leanness and efficient production, as described by Fisher (1997). Even though supply conditions are uncertain, companies in this segment have tried to overcome these problems by integrating towards the raw material source, but without the decoupling of chain participants, as recommended by Lee (2002). The stockfish supply chain cannot be characterized by either leanness or agility.

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The stockfish supply chain scores better than the whitefish filleting chain on *mass customization* and *market segmentation*, partly because of product complexity and demand variability. The nature (and trade history) of this product has ensured that further processing takes place in proximity to the end customers, to ensure their demands are met. This is not necessarily done in order to be flexible and responsive to demand changes, but as a safeguarding precaution, providing consumers with what they want, when they want it. The grading of the end product often directs it to distinct geographical Italian markets where the various qualities are most preferred by customers. The products are thus not, in fact, customized, but the market is segmented.

Additionally, in order to ensure pipeline efficiency, a seamless flow is preferably supported by a batch-to-sale configuration of goods, information sharing and collaboration among supply chain participants. If the flow of goods throughout the chain is coupled with state-of-the-art information systems "*…the transportation system becomes the warehouse*" (Tan *et al.,* 1998: 4), and "seamlessness" is more easily attained. From our presentation of the supply chains, it is obvious that the flow of goods to the market from the whitefish fillet chain is closer to fulfilling these ideal SCM requirements than that from the stockfish supply chain. The average company size in the whitefish filleting chain further contributes to fulfilling the ideal SCM requirements, and the fact that several of them belong to one manufacturing concern, eases an overall supply chain strategy and the use of tools to enable better information, co-ordination, control and organization throughout the supply chain (Cigolini *et al.,* 2004). Company size also ensures an ability to successfully implement complex logistical tools within the whitefish-filleting segment (like JIT, TQM and R&D-efforts with respect to optimal packaging and batch configuration), which, for small companies in the stockfish branch, might be deemed superfluous or redundant utilization of managerial resources (Arend & Wisner, 2005; Bates & Slack, 1998).

All in all, inspection of Table 2 reveals that the whitefish filleting branch is the one most in accordance with concurrent SCM principles – however, not a 'perfect match'. Our mapping shows that the whitefish filleting supply chain corresponds better with the "ideal" SCM characteristics in items 1 to 7 in Table 2, than does the stockfish chain. One reason might be the atypical industrialization process this segment has undergone, partly due to its political legitimacy, where the utilization of modern technology has been central. Also, of the two supply chains addressed here, whitefish filleting has suffered the most from increased competitive pressure in recent decades.

SCM and performance

The motivations for implementing SCM are many. Short-term objectives include increased productivity and reduced inventories and lead times. On a longer term, improved customer satisfaction, competitive advantage, and increased profitability (for all chain members) are the objectives (Li *et al.,* 2006; Tan *et al.,* 1998). Therefore, one promising departure for measuring the success of SCM implementation and adherence to SCM principles is looking at the organizational performance of chain members. Despite the great focus on performance effects from SCM, few studies have examined performance effects empirically, especially when it comes to the impact of SCM on company profitability. One reason for this dearth is that no consensus exists for how to measure and monitor supply chain performance. Otto & Kotzab (2003) suggested two possibilities: Either measure whether the company profits from organizing its operations in accordance with SCM principles, or measure performance against a specifically defined goal for which SCM is assumed to be a useful measure (like increasing supply security). We address profitability of SCM outcomes in line with Li *et al.,* (2006), who found that SCM practices positively influence both the level of competitive advantage and organizational performance. Vickery *et al.* (1999) found that volume flexibility positively correlated with financial performance (ROI and ROS) in the highly cyclical furniture industry. Finally, Tan *et al.* (1998) applied performance indicators (market share, return on assets, etc.) of individual manufacturing companies as dependent variables explained by the company's customer relations and sourcing practices, and found a strong correlation with corporate performance.

Average profitability in the fishing industry (i.e. the fishing fleet) has exceeded that of the fish processing industry since 1996. This is not surprising, as fishing involves the harvesting of a renewable resource, which, if managed properly, should achieve economic rent. Parallel to the multiple sourcing of fish processing companies, fishing vessels have multiple buyers for their catch, depending on price, species caught, catch area and season. Hence, the supplier base of a processing company can consist of numerous vessels, just as the circle of customers. It is natural to measure supply chain profitability at the processing stage, as this is where the main transformation process takes place, "sandwiched" as it is between suppliers and customers.

The two different segments of the processing industry exhibit different levels of profitability. In Figure 1, the annually weighted average of return on investments and profit margin (ROI and PM) is displayed for whitefish filleting and stockfish processors from 1995 to 2009. While profit margins illustrate how much of the sales end up as profit to owners (and tax), return on investment allows for a measuring of profit against total productive capital employed.

Figure 1 shows that the stockfish processors have enjoyed better profitability than the whitefish filleting industry, both in terms of ROI and PM, in the period. Large inter-year variations take place, but stockfish companies have clearly, on average, generated better results than whitefish filleting companies. As can also be seen, the financial crisis in 2008/2009 hit this industry hard. Together with exchange rate unrest, it hit the stockfish supply chain the hardest, because the main export country (Italy) belongs to the group of EU-countries struggling the most in the wake of the financial crisis. Still, the finding is surprising, as it, from an SCM perspective, contradicts conventional recommendations.

We demonstrated above that the organization of the stockfish supply chain is inferior to that of whitefish filleting, as measured against the "ideals" from SCM. Here, we find the supply chain best in accordance with SCM principles also to perform the worst. Below, we shed some light on the paradox of SCM principle adherence and the lack of profitability effects therefrom.

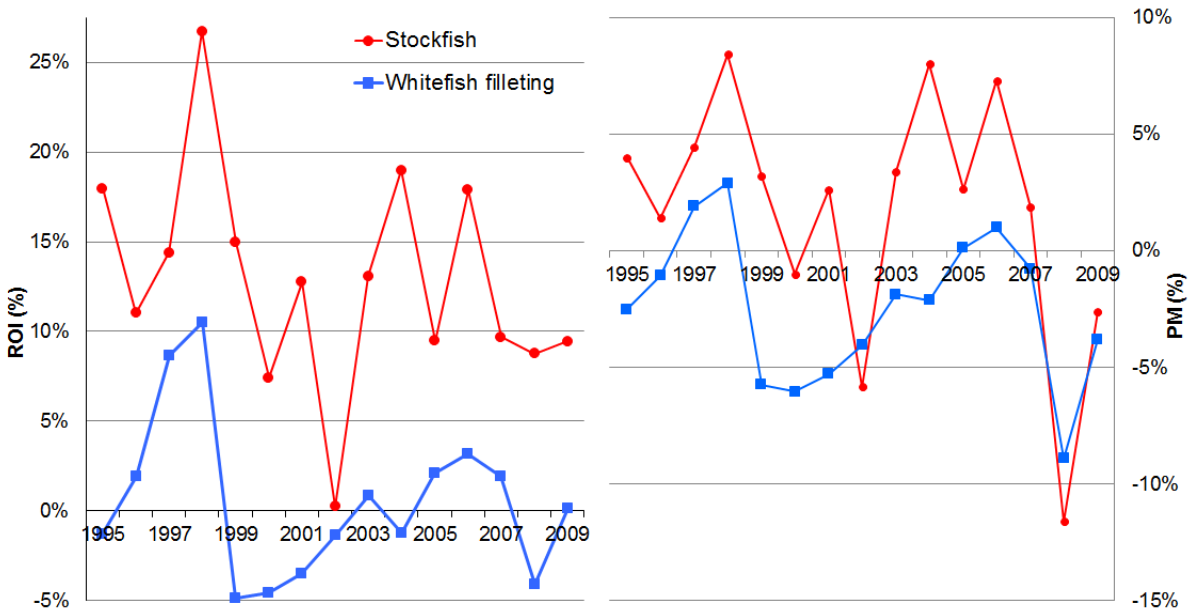

Figure 1 *Return on investments (left) and profit margin (right) for whitefish filleting and stockfish firms in the period 1995–2009. Source: Bendiksen (2010)*

Discussion

Our results shows that prevailing SCM principles are more commonly implemented in the whitefish filleting supply chain than in the stockfish chain. Contradictory to literature prescriptions, our findings indicate that the stockfish supply chain displays greater long-term financial performance (i.e. competitive advantage) than the whitefish filleting supply chain, despite the fact that it to a much lesser degree conforms with prescriptions of "ideal" SCM. To our knowledge, the only SCM research undertaken in a similar setting, is Hameri & Pálsson's (2003) study from the Icelandic fisheries industry[ix]. They take a wider approach, where they map the situation of the Icelandic seafood supply chain and point to its single largest challenge, which is to absorb raw material flow variations upstream, as – after all – the demand for fresh, salted and frozen fish is relatively stable.

According to Chen *et al.* (2004), supply management contributes to enhanced financial performance for the buying company, but is also important in fostering supply management capabilities, which may generate durable strategic advantages. In our setting, the reasons why SCM compliance does not coincide with durable top-class financial performance can be many. One is that gaining and sustaining competitive advantages require more than a well-designed and well-managed supply chain. Company size might also play a role. Here, we find the largest companies, both in terms of turnover and the number of employees, within the whitefish-filleting branch. According to Li *et al.* (2006), large organizations require more effective management of their supply chains, as their supply chain networks are more complex than those of their smaller competitors. For a supply chain designed for scale economies (hence, low unit costs), it might be unfair to be measured against a flexible chain with seasonal production, serving a niche market, even though the supply side challenges are similar. Small companies in this uncertain supply side environment might have benefitted from capabilities emphasising flexibility, which have been harder to implement in larger organizations with higher capacities (minimum efficient scale) and corresponding cost penalties (Dreyer & Grønhaug, 2004; Vickery *et al.,* 1999). Consequently, larger companies with specialized equipment and a strategy to serve the market in a continuous manner are heavily penalized if supplies fail to appear, and production is temporarily shut down, because their fixed costs are relatively high. The crucial issue here is the supply side uncertainty, and, as noted by Ottesen & Grønhaug (2003), managers

in the Norwegian fish processing industry devote most of their attention towards one specific part of the business environment—the input market. Hence, the uncertainty created by nature and/or the strategic acts of the processing companies' counterpart in the raw material market, is the single most resource-demanding feature for managers in this industry.

Product characteristics and consumer demand also shed light on performance differences. Globalization, competitive pressure and market fragmentation have affected whitefish filleting companies much more severely than the stockfish supply chain. With its commodity-like product exposed to competition from other species and from other nations, the whitefish filleting branch is 'stuck in the middle' with falling margins, due to increased competitive pressure in both input and output markets. Onboard freezing and subsequent warehousing opened up the raw material market, which eroded localization advantages. Due to this, Norwegian whitefish fillet producers found themselves in competition with Chinese companies[x], producing the "same" product at lower labour costs, but also with less valuable species like Alaska pollock, hake, pangasius, tilapia and blue whiting. Structural changes in the supply chain, with increased bargaining leverage at the retailer stage, have also altered the business landscape considerably. The dynamic and rapid changes in the competitive environment led to eroding advantages for whitefish fillet processors (Bendiksen & Dreyer, 2003; Sogn-Grundvåg *et al.,* 2007). Even though conditions were in place for near ideal SCM in this segment, the possibilities for profitability levels above average became limited as time passed.

Norwegian stockfish has one major market (Italy); few substitutes exist, and processors are to a large degree insulated from the competitive pressure affecting whitefish filleting companies. Instead of trying to control the uncertain supply environment in which fish processing companies are embedded, history and tradition have taught stockfish producers to adapt to the inherent uncertainty, and enabled them to respond in a flexible manner to supply uncertainty, since demand conditions have appeared to be relatively stable. For stockfish producers, weather and climate unpredictability also exacerbates uncertainty within the manufacturing process. In fact, this SC's adherence to market segmentation and mass customization principles is by and large dictated by biology and weather conditions. Segmentation is mainly geographical, based on consumer preferences. Processors, however, have very little influence on the end product. Once the fish is on the rack, weather does its trick and the grader later determines quality according to his best ability. Similarly, the element of mass customization follows the same pattern. This supply chain has also kept their localization advantage despite vast structural changes in the fishing fleet, due to their demand for large sized cod, which is more or less guaranteed as long as the fish continues to migrate to Lofoten to spawn. Furthermore, the demand side for stockfish is stable and Norwegian processors are, by and large, shielded from foreign competitors for this functional product. The product characteristics (with respect to shelf life and transport requirements) enables warehousing practically anywhere downstream the supply chain, which should favour SCM practices among chain participants. Such practices are, however, not implemented. One reason for this is that countering uncertainty (i.e. implementing SCM) is demanding on both time and resources, and might produce a great deal of hassle (Mason-Jones & Towill, 2000) – a cost small-scale stockfish producers are unwilling to bear all the while demand uncertainty is handled satisfactorily.

Supply side conditions are the largest obstacle to implementation of effective SCM practices in our setting, but in literature, this side of the coin is often neglected as a problem for the supply chain. For instance, Mason-Jones & Towill (2000: 45) ascertain that "*… the supply side and manufacturing process segments are essentially under the direct control of the business and may be tackled using principles such as lean thinking*". Furthermore, Childerhouse & Towill (2004: 586) assert that "*… supplier interface uncertainty results from non-compliance with our orders*". In the fish processing industry, this is clearly not the case. Orders for fish are only exceptionally placed, and the supplier interface is either near faceless, as in the case

with frozen fish or pelagic fish auctions, or highly relational, as in the traditional long-term relationship between co-localized vessel owners and processors.

If SCM literature is to address the challenges occurring in supply chains like these, it is important to emphasize the supply of fish as a "push" system, rather than to assume it is a demand-driven "pull" system. Hence, theory prescriptions are only to a limited degree able to address the SCM challenges in our setting, because the demand-driven paradigm is offset by the potential limitation that upstream supplies can be unavailable when downstream demand arises. Taylor & Fearne's (2006) study from agri-food chains ascertains that even though seasonality and unpredictable events such as weather changes impact end-user demand for fresh food products, promotional policies was the most common reason for the variability in weekly consumer demand. In the supply chains visited here, we would argue that the up-stream supply variability exceeds that of the demand side, at least for the stockfish chain. Hull (2005) gives several examples of supply chains in which the flow of goods and services is triggered by the supplier of the product, not by customer demands or demand forecasts. One of these examples is a supply chains like ours, with perishable products and variable supply. In such supply chains, Hull acknowledges that:

> *"…customers' needs, while always important, are subordinated to the decisions and needs of the supply source" (p. 219).*

This corresponds with Ottesen & Grønhaug's (2003) findings from the Norwegian fish processing industry, where the greatest attention of managers was directed towards the supply source.

Hull's (2005) treatment of supply-driven chains are categorized in four major themes, which all suit our cases. First, supply initiates the product flow, and operation interruptions must be resolved quickly to avoid significant delay penalties. Second, 'resilience' is needed to ensure the flow of supply. Alternative markets should be available if one fails, or price adjustments should be made to encourage (or discourage) demand. Third, products are like commodities, because they are sold on price, typically in multiple markets, geared towards the most profitable. Finally, customer services are mainly guided by price. In supply-driven chains, the bullwhip effect is reversed, based as it is on the fear of demand limitations, whereas in demand-driven chains it is based on the fear of supply limitations. In demand-driven supply chains, information sharing between chain participants is assumed to reduce the bullwhip effect. In supply-driven chains, however, information sharing might increase the bullwhip effect, because customers might demand price reductions if they gain knowledge of supply increases, reduced primary prices or operational efficiencies.

This situation could occur in our setting if, for instance, quotas or landings increase, ex-vessel prices fall or technological advantages take place in the manufacturing process. This situation occurred during the international financial crisis in 2008/2009, where a severe depreciation of the Icelandic currency, among other things, worsened terms of trade for Norwegian fish processors. As a consequence, Norwegian ex-vessel prices for cod fell by 30 percent during the first half of 2009, while stockfish prices (to Italy) fell by 40 percent from December 2008 to December 2009. Export prices for frozen cod fillets, which were more robust in terms of the number of available markets, fell by 20 percent during that year. As a consequence, the profitability in the whitefish filleting supply chain was less affected than the stockfish supply chains in 2008/2009, as shown in Figure 1. For stockfish, industrial experience-based knowledge dictates that if production and supply to the Italian market exceed approximately 3,000 tonnes annually, prices will fall, leaving everyone worse off. With more accessible information, for instance by web-based solutions on ex-vessel prices and quantities, Italian importers are equipped with much better arguments in haggling over contractual terms and conditions.

As underlined by van der Vorst *et al.* (1998), the inherent uncertainty facing managers in this industry can only marginally be remedied by

SCM. Hence, textbook ideals on SCM implementation must be adapted to the actual business environment by taking the contextual embeddedness into consideration. In our setting, uncertainty favours SCM, but SCM alone is inadequate to create and defend competitive advantages. Ellram (1991) claims that vertical integration can be seen as an alternative to SCM, and Kouvelis & Milner (2002) assert that greater supply uncertainty increases the need for vertical integration. Here, the whitefish filleting sector has undertaken upstream vertical integration. However, this strategic measure does not fully insulate the companies from the unpredictability of nature (Hermansen *et al.,* 2012). Instead, due to the seasonality of fisheries, fish processing companies invest in production capacities to be able to handle landing peaks. Despite efforts to forward fish to areas with less supply, or to sell the fish unprocessed, the result is nevertheless a substantial overcapacity in fish processing, leading to excess catch demand and ex-vessel price press.

Figure 2 shows the monthly catch volumes of cod in the northernmost Norwegian sales organization (handling 85 percent of total Norwegian cod sales), together with ex-vessel cod prices (left axis) and export prices for stockfish and frozen cod fillets (right axis) for the period January 2008 to December 2011.

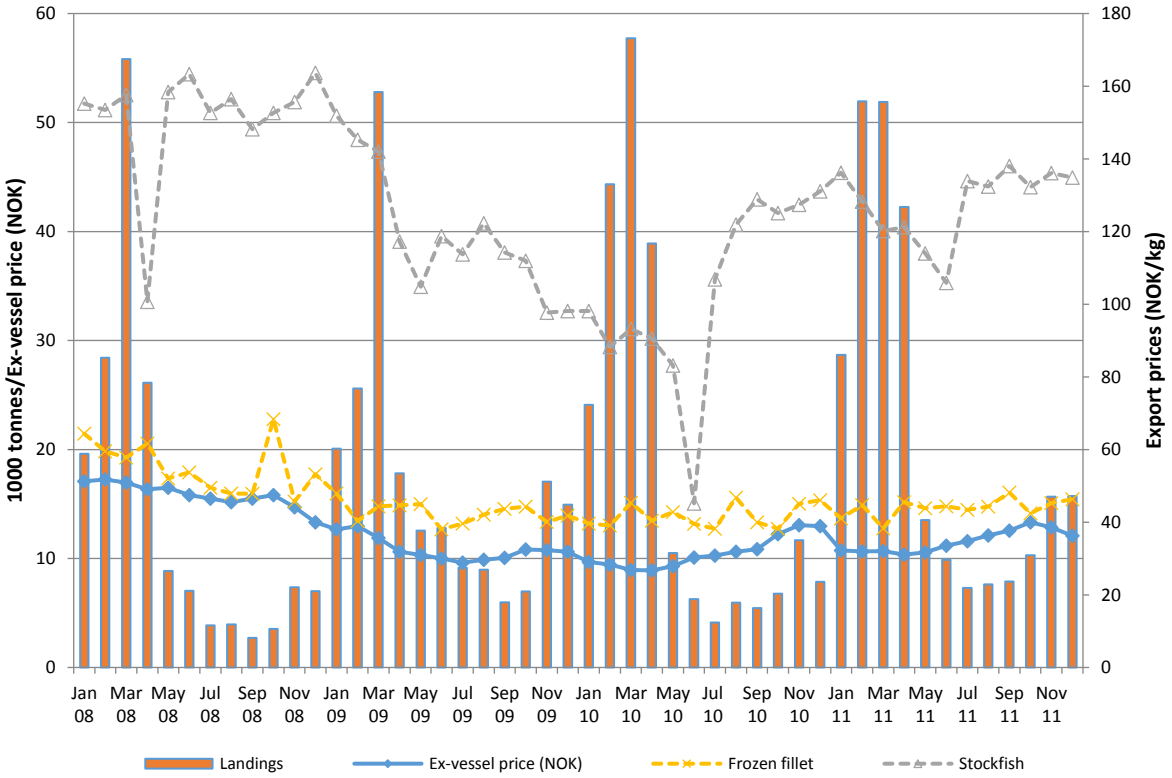

Figure 2 *Monthly landings (bars) and ex-vessel prices (blue line) for cod (left axis: in thousand tonnes and NOK) and export prices (dotted lines on right axis) for stockfish (green) and frozen fillets (purple). January 2008—December 2011. Source: Norwegian Fishermen's Sales Organization and Norway Seafood Council.*

Figure 2 shows the vast seasonal volume differences in cod landings, to which processors must adapt. Stockfish producers purchase fish during the peak months (February-March), whereas whitefish filleting companies might face serious obstacles when trying to utilize production capacity during the summer months. Fillet export prices correspond more to the trend of the ex-vessel price than what is the case for stockfish export prices. Price levels for the two also reflect the ratio between round/live weight and

product weight, which on average is 3.25 and 6.53 for fillet and stockfish from cod, respectively. The reduction in stockfish export prices is more severe compared to ex-vessel prices after November 2008. What makes this dramatic for stockfish producers is the time lag between purchase and sale, and the work-in-process inventory. Since fish is purchased in the winter, processed throughout the spring and summer and then sold in the autumn, the 2009 season was quite challenging for stockfish producers, who had purchased fish at prices that were hard to redeem in the market later that year. Stockfish export prices appear to have largely recovered in 2010. For whitefish filleting companies, operating under much shorter lead times, break-even prices seemed much more feasible, with greater flexibility to exploit the margins between input and output prices. It should be noted that behind the average prices and profit measures we operate with here, a vast variation exist, implying that we find firms – in both supply chains – that are better off than others.

Conclusion

Recommending a single, unique and blissful SCM strategy for the Norwegian fish processing industry would likely leave more companies worse than better off. Each individual company is probably the best to judge how it should satisfy its customers – within the confines of the environment it operates. Blissful strategies, created and followed by Toyota, Dell, Wall-Mart and other powerful companies, are not necessarily easy transformed into feasible, successful strategies for SMEs. Nevertheless, lessons that can help the company make well-informed decisions can be learnt from logistics, management, economics and sociology – without trying to force a scheme upon the company. There is, however, no doubt that a proper focus on managing every step of the supply chain can turn out to be more effective than the strategy hitherto most often adopted in this industry, namely upstream vertical integration (Isaksen *et al.,* 2004). Two main challenges remain: to balance the needs of customers with the varying flow of inputs from suppliers, and to align the conflicting goals of the supplier and processor regarding fish prices. This strategic window can be favourably exploited by focusing on the core competencies companies possess, mainly related to processing know-how and detailed product market knowledge. This is valid for producers of both stockfish and whitefish fillets, and a promising point of departure could be an active supply-side partitioning (Erevelles & Stevenson, 2006) and strategic supplier segmentation (Pressey *et al.,* 2009), where the company differentiate between its 'arms-length' suppliers and 'partners' (Dyer *et al.,* 1998).

Profitability variations can be explained by many different factors. The competitive power and position of companies are often linked to either a good cost position and/or a superior value position. A company's competitive advantage, relative to its competitors, can be the result of the company's ability to enjoy a collection of resources that enables it to market products that are either perceived by customers to be of higher value and/or produced at lower costs (Hunt & Morgan, 1995). In our context, stockfish producers have obviously enjoyed a greater competitive advantage than filleting companies, but SCM can only to a limited degree explain this difference. The advantage of the stockfish supply chain seems to stem from their unique product with relative few competitors—a unique regional brand feature similar to those of Cognac, Parmesan cheese or Iberian ham: The Lofoten stockfish.

In this study, we have not tried to explain the significant profitability variations among stockfish companies. An important finding, however, is that the implementation of SCM in our setting has to be adapted to the distinctive characteristics that this industry is faced with in their specific context. An in-depth examination of how the stockfish companies individually handle SCM tasks would therefore be an interesting continuation of this study. The level of analysis should be changed, from industry to company (or rather single supply chain), because SCM in its nature is an activity undertaken by (groups of) companies, not industries. Similarly, in the whitefish filleting supply chain, a study could be carried out in order to isolate the effect of

whether a varying degree of SCM implementation among companies can explain the variations in profitability. In this perspective, a more thorough analysis of individual successful companies' implementation of SCM strategies could prove fruitful, to point to profitable effects therefrom.

By adopting the idea that SCM must be adapted to the challenges producers are facing, changes in the context and business climate can alter the value and significance of SCM. A technological development in the stockfish chain, enabling a cost-effective and quality-enhancing artificial drying of cod (even frozen at sea), could potentially render the advantage of Lofoten producers redundant and erode profitability in this chain. Such a scenario will probably make SCM much more important than under today's processing technology.

For policy makers, any step to improve information sharing in the chain, enabling the potential for traceability and, thus, increased customer satisfaction, would support the chain's competitive power and improve SCM. Further, to keep and protect Norwegian seafood producers' competitiveness on the global marketplace it is essential that authorities manage waters and fish stocks in a sustainable manner, so that products can be marketed as healthy, and "*originating from cold, clear Norwegian waters*".

The practical implication from this study is that company managers in this industry need to develop contextual knowledge and take into account the distinct characteristics in the industry as well as the products they produce and offer, when implementing SCM. Success will depend upon a best possible utilization of and adaptation to the resources deployable for the supply chain.

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Notes

i The ideals presented are collected from Storey *et al.* (2006) but correspond to other treatments of SCM (best) practice. See for instance Christopher's (2005: 288-92)*"7 critical business transformations"*; from supplier to customer centric; from push to pull; from inventory to information; from transactions to relationships; from "trucks-to-shed" to "end-to-end" pipeline management; from functions to processes; and from stand-alone competition to network rivalry. Also Coyle *et al.'s* (2003: 22-25) "SCM Characteristics" are parallel to these (i.e. inventory visibility, pull systems, landed costs (at the end of the pipeline), real-time information, customer service and supply chain collaboration).

ii Rajola (2003: 9) defines the *technical core* of an organization as: *"the company's 'engine room', i.e., the area where product/service production takes place. Such an area needs to be protected and preserved from external influences because it produces efficiency and therefore needs stability."*

iii Ellram (1991) also claims that vertical integration can be seen as an alternative to SCM, while Kouvelis and Milner (2002) assert that greater supply uncertainty increases the need for vertical integration. On the other hand, Christopher (2005) argues that SCM is not the same as vertical integration; it was once thought to be a desirable strategy but with increased focus on 'core business', other activities are 'outsourced' and procured outside.

iv Following Olhager *et al.'s* (2006: 19) definition: *"A decoupling point divides the value chain into two distinct parts; one upstream with certain characteristics and one downstream with distinctly different characteristics."*

v In the 1990's, annual Norwegian cod quotas (and catch) varied between 113,000 and 399,000 tons. Even in the period 1999–2011, where a specific quota stabilization rule was included in the management plan, the standard deviation on annual cod quotas was 18 percent. For annual slaughter weight of cattle, sheep and pork in Norway in the same period, the standard deviation was 4, 4 and 8 percent respectively.

vi Similar, and more thorough, descriptions of different production processes can be found in textbooks for seafood production (see for instance Lynum, 2005; Pedersen, 1989; Berge, 1996: Burgess *et al.,* 1967)

vii In 2004, six dominating stockfish producers established a mutual export company, serving as a price guarantor for processors and to "speak with one voice" towards Italian importers. The co-operation was suspended in 2009, since members did not stick to agreed minimum prices; the curse of the cartel.

viii In later years, the industry's emphasis has been on fresh, rather than frozen, fillets. Earlier, the whole fillet went to the 400 grams box. Today, however, this product is so price strained, due to foreign and offshore competition, that every measure is taken to direct the raw material to its best paid option. Now, the fillet is split into three products: loins, tails and belly flaps. The loin (the prime cut) is most important and best paid. Cod loins, from fish no older than four days, is marketed fresh, while older loins go to wet-pack or vacuum

packed frozen products. Hence, the 400 grams box of frozen fillets is now a by-product (Sogn-Grundvåg *et al.* 2007).

ix Otherwise, the closest to the fishing industry one comes in SCM literature, is the following analogy, given by a manager who explains how he manages his business relationship with suppliers (in Petersen *et al.* 2005: 372): *"Suppliers are like fish in the ocean. We (the buyers) are the fishermen.* (…) *There are several problems associated with fishing: How do we know we are using the right bait? How do we know the right kinds of fish are in the water? Most importantly; when we catch a fish, how do we know whether it is the right fish, and whether we should keep it or throw it back in the water? Finally, how do we know the fish will follow through with its commitments if we decide to keep it?"* Needless to say; this is a metaphor, far from the reality that Norwegian fish processing companies operate in.

x The erection of cold storage plants and auctions was a blessing not only for the fishing fleet. Some branches grasped the opportunity of the detachment of catch areas and landing location on, and processing localization. Hence, cold storage plants and has constituted an effective decoupling point for some industry participants.