VALUE-CHAIN INNOVATION IN AQUACULTURE:

Insights from a New Zealand Case Study

Jayaram K. Sankaran
Associate Professor, Dept. of Information Systems & Operations Management
The University of Auckland, Private Bag 92019, Auckland, New Zealand.
Telephone No: 64 9 373 7599, x87357. Facsimile No:  64 9 373 7430
Email: j.sankaran@auckland.ac.nz

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Abstract

The present research has been undertaken as part of a New Zealand Foundation for Research Science & Technology project on the determinants of innovation and growth in the country’s seafood sector. We report a case study of value-chain innovation in a niche, export-oriented aquaculture industry, namely, king salmon (that contrasts with the much more common Atlantic/Norwegian salmon). The firm in question is vertically integrated, thus offering a ‘cradle-to-grave’ vista of innovation that spans ‘production’ (i.e., farming), processing, marketing, and distribution.

While extant empirical research into R&D and innovation suggests that product- and process-orientations tend to exclude each other in the food industry, we find evidence of both orientations in the firm under discussion. This departure from the literature can be attributed to both the vertically integrated nature of the firm and the niche nature of the industry, which in turn push for investments in R&D in fish farming, new product development, as well as process improvement and innovation. We also develop propositions for further empirical testing in the seafood industry, and aquaculture in particular.

*Keywords:* value chains; innovation; aquaculture; vertical integration; new product development; case study; food industry.
INTRODUCTION

The research reported here has been conducted under the aegis of an ongoing four-year project sponsored by the New Zealand (NZ) Foundation for Research Science & Technology (FRST) entitled, ‘Determinants of innovation and growth in the seafood sector.’ (The author is one of the investigators on the project.) One of the milestones in the FRST project is the development and implementation of a practical survey for assessing the detailed insights of innovation from a wide range of seafood industry participants. The survey instrument will be partly predicated on case studies of value-chain innovation in the seafood industry.

In-depth case studies such as the one reported here were also seen to be complementary to other strands of research in the FRST project that examined the industry-level impact of innovation on production efficiency (Sharp & Jeffs, 2004) or presented overviews of innovation in aquaculture in NZ (Jeffs, 2003). The grounded descriptions of value-chain innovation would themselves be an important deliverable of the present project inasmuch as success stories could be properly ‘showcased’ for the benefit of the industry at large.

The FRST project in NZ is, in turn, in line with one of the findings of the Seafish project on value-chain analysis in the UK seafood industry (KPMG AS et al., 2004). That study identified an important area for improvement for the UK Government as being to stimulate innovation through research and increased co-operation between commercial and institutional sectors (universities, etc.). The present research has the same broad purport as Morgan & Blake (1999) and Morgan et al. (2003) who undertook case study research into the UK food and drink industry under the aegis of the UK Government’s Foresight Programme to reveal the manifold ways in which firms have been innovative in their use of technology. The aim of Morgan et al. (2003)’s research was “to highlight innovation in the food chain and to disseminate the lessons from the processes and outcomes of this innovation to the broader sector” (p. 335).

We note however that a major point of difference between the present research and Morgan et al. (2003) is the level of analysis: ours is at the level of the firm (or if the firm is vertically
integrated, the value-chain) whereas Morgan et al.’s is at the level of specific innovations within the food chain (they profiled eight cases). Our choice of the former approach was driven by our belief that specific innovations in the value-chain for aquaculture were best understood against a broader backcloth, such as the strategic goals of the innovating firm, in lieu of being studied in isolation. Indeed, the general lessons gleaned by Morgan et al. (2003, pp. 349-351), such as the need for firms to devise clear structures to facilitate innovation, reinforce our contention that innovations such as those described by Morgan et al. (2003) should ideally not be examined in a vacuum.

Some preliminary definitions are necessary to help frame the ensuing discussion. For the present purposes, the value chain may be taken loosely as the chain of value-creating activities (both within and across enterprises). (In the original definition of Porter [1980], the value-chain refers to the sequential set of primary and support activities that a firm performs to turn inputs into value-added outputs for its external customers.) Our operational definition of ‘innovation’ follows the guidelines of the OECD (the definition is also used by Statistics NZ): innovation is the introduction of a new or significantly improved product or service to the market, or the introduction of a new or significantly improved process to a business (Fallow, 2004). The perspective adopted by Morgan et al. (2003, p. 335) in their research was that “innovation … in its simplest form … is generating and exploiting creativity, whether it relates to products, processes or organizational features,” and includes the creation, adaptation, and adoption of new technologies. In the manner of Harmsen et al. (2000, p. 152) and in keeping with the 1980 Frascati Manual (OECD, 1981), we view R&D (Research & Development) as being mainly the scientific steps associated with the innovation process. This process also consists of the technical, commercial, and financial steps that are necessary for the successful development and marketing of new or improved products and the commercial use of new or improved processes.

Nevertheless, business developments/improvements typically reside on a continuum. Therefore, we do not draw too fine a line between the development of new product categories and product-range extensions or between process innovations and the continuous improvement of processes.
Indeed, innovation is itself a matter of perception: Kotler (1991, cited in Traill & Grunert, 1997, p. 4) observed that “an innovation refers to any good, service, or idea that is perceived by someone as new. The idea may have a long history, but it is an innovation to the person who sees it as new.” We return to this point subsequently in the paper.

The objective of the present research is to induce insight, from in-depth case study research, into the conditions for successful innovation in NZ seafood value/supply chains and furnish answers to a few key questions: What forms do innovations in such value chains assume? What factors underpin successful innovation, and what barriers need be overcome?

In light of this objective and research questions, we report a case study of value-chain innovation in a leading NZ aquaculture company, NZ King Salmon (henceforth, NZKS), which is headquartered in Nelson, New Zealand. Aquaculture would be a particularly relevant domain for the present purposes given that historically, it has been “one step ahead of the capture fisheries” in product differentiation and customization (Kinnucan et al., 2003, p. 36).

The choice of NZKS has been quite deliberate. First, the percentage of sales that is invested by NZKS in R&D is more than that for most firms in the New Zealand aquaculture sector. Second, NZKS’s investment, as a percentage of sales, in the development of new products and new processes (in both manufacturing and distribution) as well as the development of new markets is comparable to that invested by larger aquaculture companies overseas. In this context, we note Traill & Meulenberg (2002, p. 8)’s hypothesis induced from the case studies on product and process innovation in the food industry reported in Traill & Grunert (1997) that “there is no relationship between company size and innovation.”

The above facts have been ascertained through formal and informal benchmarking exercises that NZKS has conducted with reference to other participants in the industry, both in NZ and overseas. The GM (Sales & Marketing) of NZKS noted that the firm uses “a variety of methods of [benchmarking], including regular visits and discussions with participants, subscription to news services, purchasing industry reports from trade market researchers [etc.].”
The third reason for choosing NZKS is that it is highly export-oriented, realizing over half its sales revenue as well as volumes from exports – which is entirely in keeping with the thrust of the FRST project of stimulating export-led growth in the seafood sector. Fourth, at the time of this writing, NZKS belonged to the top 1-2% of salmon farming companies around the world in terms of profitability; this particular finding was corroborated through a certain industry report. (It must be noted that profitability at NZKS is not as subject to exchange rate fluctuations compared with other NZ exporters because a weak NZ dollar increases the cost of importing fishmeal, which is a sizeable component of landed costs.)

The fifth reason for our choice is that by being vertically integrated, NZKS offers a vista of innovation in the entire value-chain for a specific sector within the NZ seafood industry. The value-chain spans production (characterized as ‘catch/farming’ by Iversen [2004, p. 42] in his sketch of the value-chain for seafood), processing, marketing, distribution, and service (e.g., traceability [Iversen, 2004]). As the ensuing review of the literature confirms, case studies that take such an end-to-end perspective of innovation in aquaculture are elusive; most focus on either farming or, to a lesser extent, new product development but not both. Thus, this ‘cradle-to-grave’ view of innovation is a major point of departure for the research reported here.

The final reason for the choice of NZKS was that the author had earlier been quite impressed by a case study of NZKS’s implementation of an Enterprise Resource Planning (ERP) system (the case study is available at www.istart.co.nz, NZ’s e-commerce portal [Anonymous, 2001]). This case study described the sound, ‘textbook’ manner in which NZKS had chosen its ERP solution (Movex™) in relation to its business process needs, which in turn were driven by its competitive strategy of differentiation through quality, delivery reliability, and customer service (El-Sawy, 2001, pp. 11-12). The GM (Corporate Services & Finance) observed, “When we looked at functionality we looked at it not so much from a systems point of view but from a business process viewpoint and we ranked the [available ERP] solutions in terms of importance” (Anonymous, 2001). In fact, for this pedagogical aspect, the case study had featured in an exam as well as an
assignment for courses on business process design at the author’s institution. A sound understanding by NZKS of business-processes and the need for cross-functionality would suggest a process-focus in other spheres of business activity as well, such as new product development, that are pertinent to innovation (Hammer & Stanton, 1999; Croxton et al., 2001).

For the above reasons, NZKS was believed to be an ideal candidate for an in-depth case study of value-chain innovation. Further, the organization proved to be extremely accessible.

The paper is organized as follows. We first review the relevant literature and then describe the methodology for the case study. We subsequently present the case study that we have organized along a few major themes: the link between innovation and strategy at NZKS; R&D at NZKS; perspectives of innovation at NZKS; and innovation & development processes at NZKS. We conclude with a summary of insights that we can ‘takeaway’ for further research.

**LITERATURE REVIEW**

Research into value-chain innovation in aquaculture per se is quite scant, and one perforce expands the scope of one’s literature review in the context of research of the present kind. One means of expanding the scope is to look at broader subject-domains, e.g., innovation in food industries (not just seafood) that might subsume some aspects of innovation in aquaculture (e.g., new product [food] development). Traill & Grunert (1997) featured a dozen case studies of product and process innovation in the food industry, one of which was Royal Greenland A/S for which the most important product category was prawns (Harmsen & Traill, 1997).

Another means of expanding the scope of the review is to examine related industries and/or product-categories (e.g., perishables such as cut-flowers [Anonymous, 1995] and fresh-produce [Fearne & Hughes, 2000], or other process industries in NZ such as forestry [Wilson & Sankaran, 2001] and dairy [Stevenson, 1997]), and draw parallels that might apply to aquaculture. Tvetereås & Kvaløy (2003, pp. 8-9) however cited “some notable differences” between salmon aquaculture and agricultural sectors such as poultry and beef. These include: the comparatively greater degree of perishability of fish, and consequent greater need for investment and coordination in the supply
chain to preserve product quality; the relative difficulty of monitoring external inputs in the production process in offshore aquaculture compared with agriculture which is land-based; and the greater degree of overseas trade in salmon.

A third means is to look at resources on aquaculture (e.g., Heen, Monahan, & Utter [1993]) that might feature a limited discussion of innovation. Such discussion could transpire in the context of new product development within the marketing function (e.g., Shaw, 1993, which is a chapter in Heen et al. [1993]).

Even such an expanded literature review may not be very fruitful. Indeed, research into innovation in the food industry itself (not just aquaculture) has been deemed to be scant possibly because of the low intensity of R&D in the industry (Grunert, Harmsen, Meulenberg, Kuiper et al., 1997, p. 7; Harmsen, 1996, as cited in Harmsen et al., 2000). The food industry has in fact been characterized as a major ‘carrier’ industry, i.e., a downstream consumer-oriented industry that adopts widespread use of new technologies that are developed in upstream, high-tech industries such as electronics, advanced materials, and biotechnology (Christenden et al., 1996, as cited by Grunert, Harmsen, Meulenberg, Kuiper et al. [1997, p. 7]; Morgan et al., 2003, p. 335). From the case studies reported in Traill & Grunert (1997), Harmsen et al. (2000) induced a model of innovation success in what they deemed ‘low-tech’ (i.e., food) companies. The model features the interplay of three constructs, namely, product orientation, process orientation, and market orientation, and their impact on innovation and thereby firm performance. Drawing upon the same body of cases as Harmsen et al. (2000), Traill & Meulenberg (2002) induced several hypotheses for which they found some empirical support from a survey of food manufacturers.

Some studies touch upon innovation, to a greater or lesser extent, while addressing the farming end of the aquaculture value-chain (Aarset, 1999; Asche et al, 1999; Engle, 2003). Asche et al. (1999) elaborated the environmental problems encountered in Norwegian salmon (also known as Atlantic salmon) aquaculture; their discussion of innovation is principally with reference to combating these problems (pp. 25-27). While reviewing catfish aquaculture in the US, which is the
most successful aquaculture business in that region, Engle (2003) noted technological innovations that have increased yields by increasing land-use efficiency. She argued that market-oriented agribusiness approaches to catfish marketing would become the order of the day to offset various difficulties on the production side.

In an interesting comparative analysis, Aarset (1999) contrasted the booming Norwegian salmon farming industry with the hitherto commercially unsuccessful farming of Arctic char, which belongs to the same family (salmonid) as Atlantic and king salmon. Aarset’s comparison is apposite to this paper because Arctic char stands in similar contrast with Norwegian/Atlantic salmon as king salmon (also known as Chinook salmon): it is viewed as a niche product based on high quality and price in relation to Norwegian salmon which, by the late 1980s, was “losing its status as an exclusive commodity, due to the industry’s excessive expansion” (Aarset, 1999, p. 183). Aarset attributed the relative failure of Arctic char farming partly to the tendency to import technological solutions from salmon farming, and thus implicitly treat the two as identical (1999, p. 184). He believed that the main problem with Arctic char farming was the comparatively inferior linkage between research and industrial activity.

Iversen (2004) touched upon innovation in the context of strategic options that were available to the Norwegian seafood industry in the light of globalization. He gave examples of the increasingly dispersed nature of the value-chain for Norwegian seafood; he cited the growth of on-board freezing facilities as being an important technological shift that has made feasible the long-distance transportation of frozen fish for processing anywhere. Iversen also noted the need for differentiation by processors through branding, new product development, as well as the supply of more valuable fresh fish (2004, p. 38).

**METHODOLOGY**

Prior to fieldwork, a thorough review of the relevant literature on value-chain innovation in the seafood industry and like industries was conducted. Two online resources (NZKS’s website [www.kingsalmon.co.nz] as well as the earlier-mentioned write-up on NZKS’s implementation of
Movex™) were also closely examined. In all, these various sources furnished an initial set of 36 themes to explore in the context of innovation within the company as well as the external value-chain; roughly two-thirds of the themes focused on the former. However, in light of the exploratory character of the research and the single-site nature of the study, the research process was deliberately kept open. This contrasts with the multi-site case study research into product and process innovation in the food industry that was conducted concurrently by several investigators in different locations in Europe (Traill & Grunert, 1997). In such a situation, fairly structured, a priori frameworks for data collection are necessary to enable comparable case descriptions and cross-case analysis (Miles & Huberman, 1994; Traill & Grunert, 1997, pp. 227-230).

A field trip to Nelson, NZ, was undertaken to conduct in-depth interviews with executives of NZKS. The technique used was snowball sampling: a key respondent (the GM of Sales & Marketing, who oversaw new product development) was first interviewed for nearly four hours, spread across two sessions. (This GM was in the first instance referred by the GM of Aquaculture.) The focus in the interviews was primarily on new product development and to a lesser extent on accompanying new process development, as well as R&D. The author also had a brief session with this GM along with the Chief Executive.

In the course of the interviews, the GM of Sales & Marketing suggested that the GM (Corporate Services & Finance) would be able to shed additional light on topics such as accounting for R&D. After an interval of a day for mulling over the tape-recorded interviews with the GM (Sales & Marketing), and supplementing the initial set of questions with questions that emerged from these interviews, a second round of interviews was held. The first interview was with the GM (Corporate Services & Finance) and lasted about two hours. The GM (Manufacturing) also participated in this interview; he was able to shed light on the continuous improvement program in place at NZKS and for this purpose, also summoned the Process Systems Engineer, who was able to participate for a portion of the interview. After a plant-visit conducted by the Process Systems Engineer, a closing interview with the Market Services Manager was held to tie up loose ends regarding innovations in
distribution including packaging, handling, etc. In the course of data analysis and preparation of the research report, several other issues arose which were in turn clarified in depth by the GM of Sales & Marketing. (In the ensuing case description, we quote the respondents extensively in the spirit of much qualitative research wherein “the frequent use of subjects’ discourse reflects a concern to forge interpretations in terms of their own natural language” [Bryman, 1989, p. 137].)

Based on the responses to questions in the interviews (especially the joint interview with three executives), it appeared to the author that it might be restrictive to look at only those aspects of innovation that pertained to the development of new products and/or the deployment of new technologies. For instance, a major development at NZKS that had recently transpired was the move to a night-shift operation in a critical, preliminary stage in the production process. This move had facilitated the matching of supply with demand for fresh product, as a result of which flexibility in order fulfilment was enhanced and costs decreased owing to the diminished need to airfreight product to transportation hubs for exports. From the company’s perspective, it was a significant change in the way it operated; for instance, operational planning cycles changed completely (“180 degrees”). To NZKS it was an innovation; few comparable companies in NZ, including those outside the seafood sector in other food industries, had effected such a change. Such a change would correspond to innovation with respect to organizational features (Morgan et al., 2003, p. 335).

As a result, the case study that is presented here does not attempt to circumscribe the notion of innovation and instead discusses most of the business developments that emerged from the interviews. However it will emphasize value-chain innovation, given the nature of the present research strand.

The interview transcripts were analysed through established techniques of qualitative data analysis (Strauss & Corbin, 1998). Specifically, concepts (e.g., ‘criteria for screening new product ideas’) were induced and defined in terms of their included indicators (which are events or happenings that fit into the concepts). Such concepts were iteratively redefined, modified, and
enlarged in the face of additional data. These concepts were then grouped under overarching categories; thus the concept, ‘criteria for screening new product ideas,’ was subsumed under a category that was labelled the ‘new product development process.’ The case study that features below is an elaboration of the various categories. As an aside, we note that the manner of representing concepts, indicators, etc., also lends itself to the development of an empirically grounded questionnaire that will be subsequently administered in the FRST project to a representative sample of seafood companies.

The case study write-up was sent to the key informants for their comments and feedback, which was quite positive by all accounts and which eliminated any scope for misrepresentation and misinterpretation. Thus, the goal of respondent validation was served (Bryman, 1989, pp. 164-166). Naturally, all potentially sensitive information has been masked in the following description.

**BACKGROUND TO NZKS**

As noted in Anonymous (2001), NZKS was formed in 1996 with the privatisation and merger of New Zealand's two largest salmon companies: Southern Ocean Seafoods Ltd and Regal Salmon Ltd. NZKS is a wholly owned subsidiary of Oregon Group Ltd, which is ultimately owned by the Tiong Group. NZKS has an annual turnover of more than $50 million and employs more than 330 staff. It accounts for 80 per cent of New Zealand's total production of farmed king salmon, also known as Chinook, and 40 per cent of world production. The company has four salmon farms, two hatcheries, and processing facilities (at Nelson) including a ready-to-eat factory. It also has a broodstock research facility at Kaituna, about 60km from Nelson.

**STRATEGIC FOCUS**

It is instructive to understand innovation at NZKS against the backdrop of its competitive strategies and bases for competition. NZKS has chosen to focus on one species, king salmon, whereas many of the large salmon producers worldwide farm Atlantic salmon, which is easier to manage (for instance, Atlantic salmon tends to grow faster and converts feed into flesh more efficiently). NZKS avoids farming other species of fish (e.g., shellfish), restricting itself at most to processing of such fish, even if it might encounter difficulties in meeting market demand for by-product derivatives.
The focus on king salmon enables NZKS to maintain a point of difference in the market: “King salmon is a highly regarded, well-reputed species to go to the market with… [It is] a great product with very identifiable attributes... And it is something they want to buy and is in scarce supply; so we get a premium for our product. You can grow Atlantic salmon anywhere in the world at low cost; [the farmers of Atlantic salmon] can fight it out at the low price that they can get for it.” NZKS’ eschewal of Atlantic salmon was explained as follows: “We have recognised that the global market is heavily supplied with Atlantics and we have no competitive advantage in growing it in New Zealand. In fact, we have some comparative disadvantages in resource space, productivity, feed costs, and transport, which force us into growing a premium product. King salmon suits that niche.” (An indication of this niche is that NZKS’s overall production by tonnage is about 1% of the size of the Japanese market for salmon.) Moreover the continued focus on king salmon has accrued into “intellectual property [at NZKS] about vertically integrating the hatching, production, harvesting, processing, sales, distribution, and marketing of king salmon in a profitable manner.” As a counterpoint to NZKS, we cite an interesting case study of Atlantic salmon farming, the East Fjord Company Ltd, which is situated on the Norwegian west coast and is described by Borch (1998). This company has emerged as one of the more successful companies with the advent of industry globalization, partly due to a strategy of cost competitiveness.

As implied by the comments in the preceding paragraph, NZKS’s focus on one species is in turn related to its strategy of vertical integration. Besides retaining the benefits from value-creation, the company is able to guarantee quality and reliability by owning and controlling every state of production. One of the respondents clarified the strategy of vertical integration was “deliberate from day 1, the reason being there was not any other supplier than what we could [do] ourselves. So we had to grow our own fish in a hatchery that we owned, we had to take those fish to a sea-cage farm that we owned because there wasn’t anybody else, we had to harvest them using our own harvesting team because there wasn’t anybody else.” NZKS also bought out a company that used to do a lot of contract packing for NZKS; NZKS had become this company’s major client by the time
of the acquisition. While NZKS appeared to have choices for third-party logistics services, it opted to “use our own distribution because nobody quite understands to the extent that we do.” Further, vertical integration at NZKS appeared to snowball to other aspects of its operation: “We had to have our own seafood processing facility. Although there were many other choices, we figured, ‘Well, we have got everything else; we might as well do it ourselves.’” However, NZKS has not pursued vertical integration when economies of scale cannot be realized, an example being the production of fishmeal, which is presently imported from Chile and to a lesser extent, Tasmania in Australia.

Vertical integration has also been cited as a trend in the Norwegian salmon industry over the past 10-15 years (Tveterås & Kvaløy, 2003) - however for rather different drivers compared with NZKS. At NZKS, vertical integration derived more from the focus on quality, food safety, and reliability as well as the paucity of external providers of various competencies (e.g., harvesting, distribution) and only to a lesser extent, from cost considerations. In Norway however, food safety considerations aside, increasing economies of scale and operating capital requirements have pushed for horizontal integration in salmon farming, which in turn has contributed to forward and backward vertical integration (Tveterås & Kvaløy, 2003). New technologies that entail the substitution of labour with capital have increased the minimum efficient scale of production to more than 20000 tonnes p.a. of live fish.

In keeping with its focus on king salmon, NZKS seeks to create and operate in niche markets for its species in the markets in which it competes against Atlantic salmon such as Australia, Japan, and North America. Since NZKS accounts for 40 per cent of world production of farmed king salmon, it is able to set its own price depending on how much it wants to sell; NZKS is able to command a sizeable premium over Atlantic salmon in overseas markets (e.g., Japan). The premium increases with the extent of value-addition, which provides an incentive to NZKS to strive to take the differentiation of product right to the end of the supply chain.

Value-added product at NZKS is “something which has had more value-added than a whole fish;” NZKS realizes somewhere between 30 and 50% of its sales by value beyond a whole salmon.
As one would expect, there are varying degrees of value-addition at NZKS depending on the number of stages that product flows through in the processing facility. Highest forms of value-addition are represented by products such as smoked salmon and salmon dips (which, being of recent origin, were made at the time of this writing by another manufacturer under contract for NZKS). The next level down in terms of value-addition would be value-added portions or pieces of salmon (e.g., salmon kebabs). Salmon fillets and cuts represent “more intermediate-type [products] because they are somewhere between a value-added product and a raw commodity. But they have had more work done on them. They have been transformed.” The benefits, from a marketing perspective, of downstream processing are the ability to realize greater premiums through packaging and branding product.

In line with the differentiation from Atlantic salmon, NZKS has also “deliberately got away” from the low-cost, frozen-food, commodity market: “When you are competing with the frozen product typically for an industrial processor, you are competing against Norway and Chile with the cheapest possible salmon out there. Most often, they just lump together Chinook and Atlantic salmon. So it is not that happy for us to be in a frozen market;” fresh chilled, farmed king salmon accounts for about 75% of NZKS’s exports to Japan by tonnage. In this context, we also note that one strategy for Norwegian producers to combat the cost-competitiveness of low-wage areas such as China, Poland, and the Baltic with regard to the processing of fish, is to produce more fresh fish given the regional nature of that market (Scandinavia/Europe) (Iversen, 2004, p. 38).

The strategy of differentiation has been facilitated by increasing quality discernment on the part of end-consumers in Japan and latterly, Australia, who “appreciate the difference” between the two forms of salmon. In NZ, consumers are already familiar with quality product, as witnessed in the poor reception accorded to Canadian imports of Atlantic salmon products. In Japan, the emergence of labelling laws is working to NZKS’s favour: under the labelling laws, “If [Japanese supermarket chains] want to have kings on their retail shelves, they have to come to us or to one of our small number of competitors.”
In this regard, we note that existing case study research (e.g., the compilation on the food industry edited by Traill & Grunert, 1997) dwells on situations where the raw material is a commodity, whereas king salmon is much harder to firm and scarcer than Atlantic salmon. Hence, at NZKS, the raw material itself is a source of differentiation as opposed to just the end-product. Thus, in contrast with fisheries that entail a ‘hunting and gathering’ approach to the procurement of raw material, innovation especially manifests at various links in the value-chain for king salmon.

An element of NZKS’s strategy that is related to its differentiation from commodity markets is the reduction of its exposure to commodity cycles. Related to this reduction is NZKS’s attempt to make its supply chain more demand-driven, i.e., growing more fish in “response to a potential perceived demand as opposed to growing more fish so that we can go out and sell it somewhere.” As a result, harvest volumes have been relatively static for some years now. Instead, NZKS has sought to focus on bottom-line/revenue growth rather than volume growth whilst ensuring reasonable tonnage for economies of scale for its vertically integrated business. In turn, such growth necessitates a “reasonable amount of investment in the development of new products and new processes in the factory, new distribution, market development, etc.”

**RESEARCH AND DEVELOPMENT (R&D) AT NZKS**

In the course of the interviews with the GM (Sales & Marketing), he distinguished between “pure R,” which refers to production research, and “D,” which includes new product development (NPD). Such a distinction would appear natural at NZKS inasmuch as the scientific research facility at Kaituna focuses on broodstock research.

**PRODUCTION RESEARCH**

Production research at NZKS refers broadly to developing better ways of growing fish (“raw material”) in terms of increasing volume, achieving consistency of supply, enhancing quality, and/or lowering production costs and thereby enhancing bottom-line profitability. One strand of production research entails the design of fish to meet particular business/market needs. Market needs could be quality attributes (colour, oil, texture, etc.) that are fed back to the aquaculture team by Sales & Marketing. Business imperatives could be faster growth of fish, better conversion of
feed into flesh, and the ability to “fill the pipeline in the off-season from about mid-February to about mid-June.”

This consistency of supply of raw material could also be enabled by influencing the maturation of salmon through for instance hatchery technology or broodstock selection whereby NZKS “selects fish for rapid maturation by searching through the breed stock.” Likewise, NZKS could opt to deploy fish variously in different farms that had different biological characteristics. Feeding regimes are yet another lever for influencing maturation: “[If you] feed them more often, they will grow faster, or grow bigger. They may grow inefficiently if you force them, but at least you have that choice. Or alternatively, if you want to slow down their growth, you feed them less …; so you have got some influence on the farms.”

The techniques cited above may not be unique to NZKS and hence may not be patentable by NZKS as such. However, NZKS has found its own unique means of “putting all the bits together which are already patented by other people,” which constitutes intellectual property.

DEVELOPMENT OF NEW PRODUCTS
One strand of NPD at NZKS is the development of new products that meet market needs. Examples of these needs include simplicity (e.g., use by children) and convenience. Corporate clients (e.g., airline caterers) could have specific needs with regard to functionality (e.g., for the NZ food/quick-service market) or size: “In the catering industry in New Zealand, there are some particular dimensions of sliced smoked salmon that some food-service operators need to have.” In cases where the needs of specific corporate clients are being met, NZKS attempts to redeploy its developmental work for other prospective clients who do not compete with those clients on whose behalf the work was first undertaken. That way, it increases sales volumes and achieves a better return on its investment in developmental work.

From the perspective of value creation, an important class of new products derives from the innovative use of by-products. In their study of the UK seafood value chain, KPMG AS et al. (2004) identified one of the main opportunities for primary processors as being the improvement of by-product utilisation by focusing on product development to increase profits.
At NZKS, “An idea was to smoke and pack … fins from fish … [as cocktail nibbles] and it has been a very successful by-product utilisation.” Likewise, salmon tails are also now processed into smoked products. Mince that is made from fish frames is another example of by-product utilization.

Finally, a more minor form of NPD would be range extensions and/or development of variants (e.g., new pack-sizes).

DEVELOPMENT OF NEW PROCESSES
At NZKS, the development of new products is often accompanied by the development of new processes as well; indeed, the split of the developmental work across products and processes would be “about 50/50.” An example of this is gravalax, wherein the salmon is marinated in the traditional Scandinavian manner in sugar, salt, and spices, and then flavoured with finely chopped green dill leaf. However, NZKS has come up with its own variants on that over the years, whereby there is not as strong a need to disguise the flavour with dill. In the context of developing new processes to support new products, a respondent explained that in lieu of “strategic alliances with machinery suppliers or equipment suppliers, we go on overseas trips to have a look at different products that come through different processes and keep our eyes open using the Net, do specific research [etc.].”

While process development is often driven by product development, the introduction of new process technologies can in turn also enable NPD. An example at NZKS is the deployment of automated cutting and slicing machines that were purpose-built by a local manufacturer for NZKS. Besides increasing product quality, labour efficiency, and yield, the machines “opened doors to different sliced configurations for customers.” This technology was cited as an example of process innovation: “We took something, modified it, and made something in the top of the South Island that no one else was quite doing and that was a step change in our view, in the quality of our slices… The innovation there was to change the actual cutting process.” The above observations accord with Grunert, Harmsen, Meulenberg, Kuiper et al. (1997)’s definition of process innovation as being “an investment into a company’s skills, resources and competences, which allows the
company to introduce cost-saving changes in production processes but also to introduce new technology which allows the production of a range of products quite different from the existing one.”

Process innovation can also arise independently of the development of new products. A good example is steam pasteurisation for which NZKS has filed patents and which offers NZKS several benefits compared with the earlier practice of chlorinating fish in water baths. These include: labour efficiency; reduced input costs; improved health and safety; improved wholesomeness and food acceptability; increased naturalness of the process; and the elimination of risks that are associated with biological outbreaks as well as the resources that are needed to manage those risks.

Such innovations represent “step changes” that “NZKS couldn’t have achieved … with continuous improvement, with operators concentrating more.” The continuous improvement programme at NZKS was described as finding “new ways of making the same product but in a more efficient or safer or more profitable [manner].” Several relatively minor process developments were subsumed under the continuous improvement programme, such as in packaging/material-handling. For instance, NZKS has begun to use cardboard boxes in lieu of polystyrene bins to service some of its larger wholesalers partly because such boxes entail “less damage to a certain extent … because [fish] get layered properly into the carton so they don’t get thrown around whereas with the poly-bin … the noses of fish can get squashed.” Other developments included modifications in packaging such as the avoidance of Ezi-Peel to minimize vacuum loss while maintaining user convenience, the use of sophisticated laminate preparations to laminate bags for the ready-to-eat market, the improvement of “microns on our plastic,” and the improvement of “flute strengths of our cardboard.”

“PURE R” VS “D”
As already noted, NZKS expends a significant portion of its annual sales on developmental work. However, other salmon companies around the world appear to do quite a bit more on production research than NZKS. While acknowledging that could be partly because of the natural advantages enjoyed by NZKS in NZ, a respondent noted that “as the industry has globalised and corporatised
overseas, you are getting economies of scale allowing those larger corporates to spend more on research, not necessarily on product development, but more on production research.”

The relative expenditure on production research as opposed to developmental research is an interesting and strategic variable at NZKS. In the first instance, this question arises precisely from NZKS’s vertically integrated structure, namely, its ownership of both production and processing arms. Further, the two strands of research have somewhat (but not entirely) different drivers. Thus, one driver of production research at NZKS is the slow maturation of king salmon. The seasonality of maturation cycles, when contrasted with the business imperative of year-round supply of immediate fresh chilled salmon, is another driver for production research, in terms of accelerating/suppressing maturation.

Yet another interesting driver for production research is the very location at which such research adds value in the value chain: the fish farm. “If the guys on farms can do some research … to get their costs down, it will benefit the rest of the supply chain. So if we start with a lower cost for material from which we want to develop new products, we are all better off. So we have tended to start at the farm end rather than the value end.” This push towards production research is also reinforced by the manner in which NZKS evaluates financial performance. “We convert everything back to gross margin generated per kilo of raw material fish input to the process. It is easier to add value to a lower-cost product than a higher-cost product; you tend again to want to concentrate on getting your fish cost down.”

Interestingly enough, the very difficulty of producing raw material is also an impetus for developmental research at NZKS! While contrasting NZKS with other seafood companies that have easier access to raw material (e.g., by hunting and gathering), one of the respondents noted, “[The reason] we invest so much in growing our product [is] there is quite a long cycle time involved - 18 months, 2 years 2 ½ years depending on which strategy your fish is coming out of the water. Then once it is out of the water, within a few hours you can destroy the value of that product. So we have needed to be quite smart in what we have done and the way we have developed the
processes. And also there isn’t really anybody else doing what we are doing in the way that we are
doing it for us to look to and say, ‘Who is the leader and who should we follow.’ We have had to
be quite creative ourselves. So, yield is very important to us because of the cost of getting the fish
out of the water in the first place. There’s [quite a significant dollar amount] per kilo being invested
into it and somebody can just lose [a sizeable percentage] by slicing it the wrong way.”

As a result of the high cost of the raw material, “There has been quite a push for looking at the
by-product streams and trying to add value to those. … An A-grade whole gilled and gutted [king
salmon] is so expensive that it is very hard to add additional value to that … excluding the fillets
and steaks of course.” The high marginal returns of by-product derivatives (e.g., cocktail nibbles)
are another incentive for increased utilization of by-products; the input costs of these by-products
“are carried by the A-grade product stream and you can get gains there.”

The high cost of producing king salmon was also the driver for kebabs: “We were looking at
how we could utilise the lower grade of fish, the fish that either had scale damage or a seal bite or
something. So if we cut them up into kebabs we were getting a better return out of that lower grade
fish than you would otherwise have but kebabs themselves are now quite a volume-item.”

As already noted, a general thrust for developmental research at NZKS is its focus on
revenue/bottom-line growth in lieu of volume growth, reflecting the recognition that value-addition
is the long-term “means to survival … in this kind of industry.” (Engle [2003] concluded similarly
with regard to the catfish industry in the US.) In the abovementioned study of the UK seafood
value chain, KPMG AS et al. (2004) identified one of the main opportunities for secondary/mixed
processors as being the expansion of the overall seafood consumption market through product
innovation and marketing.

While NZKS “have always had the same view and vision” with regard to the imperative and
importance of developmental research, the realization of the vision could, in reality, be tempered by
extraneous factors, such as industry recession. “When you are faced with poor cash flows and low
profitability, you tend to concentrate on costs before value because there is less risk;” any
production cost savings go directly to the bottom-line. On the other hand, “As the profit goes up then there’s more cash for new product development… When any industry is under financial pressure, if anything they may tend to cut their development budgets; they may retain their research budgets [for] getting out of trouble, but they will be driven towards doing more cost-based research.” Nevertheless, the longer-term trend at NZKS is to invest more “towards value-added products rather than production cost-driven research.”

**PERSPECTIVES OF INNOVATION AT NZKS**

As noted in the introductory section of the paper, the perspective of innovation was deliberately left open to interpretation by the author so that it could be uncovered or exposed from an analysis of interview data rather than be imposed on the participants. Such an emphasis on revealing meanings, rather than imposing them, is fully in keeping with the ethos of much qualitative research (Bryman et al., 1988). Indeed, this open-ended approach was vindicated by a comment by one of the respondents that the notion of what constitutes innovation “might not even [be] consensual within the company.” Another respondent also alluded to this diversity of perspectives when he remarked that the question of whether or not a change in size and packaging would constitute a development was “always one that we debate amongst ourselves … ‘What do we mean by a new product development?’” (It should be noted, however, that such a change is nevertheless effected through a formal NPD project at NZKS.)

There is consensual understanding at NZKS that innovation lies at one end of a spectrum or continuum that broadly represents organizational improvement/enhancement/change. The variety of perspectives of innovation probably merely reflects the rather fine line that divides innovation from lesser forms of change (e.g., continuous improvement). A respondent observed, “We are doing [general business improvements] all the time, [namely,] new commercial arrangements with different carriers, different routes, or different configurations of the cargo. It is hardly classed as being ‘development’ [as in the ‘D’ in R&D].”
From a manufacturing perspective, innovation sits at one end of a continuum, while the standardization of processes brings up the other end and continuous improvement the midsection. The extent of involvement of personnel at NZKS with these various forms of change varies with their levels in the organizational hierarchy at NZKS. Thus, operators focus largely on standardization whereas team-leaders have a greater involvement in continuous improvement. “At middle management, we’re looking for more of innovation and continuous improvement predominantly with very little standardisation but at the top level we should be looking mainly at innovation and strategy and those sorts of things.”

In the view of one of the respondents, “We probably look at innovation as more development from where we are, our state of play now as opposed to what anybody else is doing in the world. We look at our position and the way that we are running our business and the products that we are delivering and the processes that we use, then I guess any development or major change or improvement to that for us is innovation from our current position.” The implementation of Movex™ was an innovation because it was a “huge change” for the organization given that several personnel who had been accustomed to spreadsheets for years had to switch to using Movex™ through client-server architecture.

Thus, in a broader sense, innovation at NZKS would represent any strategic “step change” from its present manner of operation that does not necessarily involve technology – quite apart from the possibility that NZKS may not be unique or pioneering in effecting such a change. Though the implementation of Movex™ in NZ had been pioneered by Tegel Foods, a company with similar business needs as NZKS, the implementation of Movex™ at NZKS was seen as an innovation by the firm given that it was a “major change from our current position.” In fact, the implementation of Movex™ itself was the impetus for another major change at NZKS, namely, the earlier-noted switch to a night-shift operation for primary processing. “This change … was something that we had debated for many years but weren’t sure that we could manage the change. Then, after the implementation of Movex™, we were confident we could … and we did it very well.”
INNOVATION & DEVELOPMENT PROCESSES AT NZKS

SOURCES OF PRODUCT/PROCESS IDEAS
At NZKS, in keeping with the link between innovation and strategic goals that was clarified earlier in the paper, innovation is part of the company-wide ethos/philosophy: “We have got 170 out of 170 [personnel employed in the processing plants] involved in R&D in some way or other, right down to operator level.” Thus, several noteworthy ideas for both product and process innovation have emerged from the coalface at NZKS. The pasteurisation process “came from one of our own people.” The use of fins to make cocktail nibbles was an instance of product ideas that emerged from the coalface. The flat organizational structure at NZKS enables innovation (Hellriegel, Slocum, and Woodman, 2000, Chapter 18). While noting there was “nothing formal” by way of incentives to employees for idea-generation, one respondent clarified that nevertheless, “We have found the culture of our company motivates staff and managers in taking an interest in new ideas and improvements which may be taken up.”

Besides employees and (as noted earlier, corporate clients with specific needs), overseas distributors who have people in Nelson that NZKS can work with are also a source of product/process ideas. Also, “We meet with [overseas distributors in offshore locations] regularly and one of the things that we will discuss is any potential new products to develop.” In the domestic market, the Auckland-based NZ Marketing Manager is a source of product ideas; he was selected expressly on account of his background in the FMCG (fast-moving-consumer-goods) sector. (Such a tactic has also been cited in the UK fresh-produce industry [Fearne & Hughes, 2000].) While not retaining chefs permanently among its personnel and/or NPD activities, NZKS does “sometimes discuss ideas with chefs based in professional catering companies.”

NZKS also uses overseas trends as a source of ideas for products or packaging: “We hear about [particular trends] and think maybe we should get more into those …; it is just an osmosis event, really keeping our eyes open.” An example was cited in the context of packaging: “Recently one of our guys saw a different presentation [of product]. He just saw it in a market; so he ripped the label off the container and found out the name of the company.” In this market [supplied by Norwegian
salmon companies]. “Fish comes in a cardboard box all beautifully printed and full of ice and it’s still around in aeroplanes. So we found out how they do that; it’s all different layers of packaging, and absorption and insulation and all the other stuff.” Likewise, Morgan et al. (2003) noted the role of chance events (serendipity) in innovation. However, they believed the role of chance or good fortune could “be increased if a firm has structures for developing ideas …, discusses ideas with customers and suppliers, increases its willingness to incorporate all views from within the company and is flexible in its approach to innovation” (p. 350). It would appear that NZKS is well positioned to capitalise on such serendipity.

**CRITERIA FOR SCREENING PRODUCT IDEAS**

All product ideas are vetted through a screening process that employs various criteria, including “potential contribution …. How much money it is going to make?” The most direct measure of economic value is the gross margin generated per kilo of raw material fish input to the process. One respondent explained, “So we can look at the dips product and make an analysis of that compared to what it used to be in its unprocessed form as a commodity … and establish very quickly whether in fact [it’s] adding value.”

The volumes needed to breakeven are a related economic consideration. For range-extensions whose launch results tend to be predictable, NZKS will do “simple testing in-house, using informal and formal focus groups consisting of experienced staff.” For innovative products, NZKS supplements internal focus groups with “additional external qualitative research provided by external researchers” that would generally involve “a blind-test of either randomly selected or targeted individuals [e.g., children for kebabs].” Omnibus quantitative studies and exit interviews are an additional recourse to mitigate risk. In case of high risk, NZKS has “developed prototype samples in limited quantity and tested specially selected stores or regions.” Key accounts, especially food service accounts and professional caterers, also furnish inputs in terms of projected sales volumes. Likewise, supermarket buyers are sounded out by NZKS for their ideas and agreement about market acceptance. At the time of this writing, NZKS did not supply private-labels (house-brands) for supermarket accounts. (As of August 2004, private-label sales were
estimated to be growing at about 10-15% p.a. in NZ and accounted for about 12 per cent of all supermarket sales [Springall, 2004].)

Breakeven volumes aside, NZKS also reckons the benefits “outside of just the straight economic costing” of that one product idea. The example of kebabs was cited: “For argument’s sake, [even if] kebabs isn’t that wonderful a product, … it gives us a lot more profile in the market than any other salmon company. Nobody else does kebabs so there are benefits.” In a related vein, another executive described NZKS’s push for differentiation in the domestic market: “We will actually create a whole new product that we think will sell, it being a new idea, and leading on to new products that are discernibly different, are differentiated in the market. Not me too’s. So we will be truly innovative in the New Zealand market.” Such product-ideas lead the market (as opposed to being driven by the marketplace): “You are actually developing the product, the concept and the idea and the people are latching on to it and that then creates the market… It is not like there are people out there saying … or thinking ‘Where can I get kebabs?’” (This corresponds with the philosophy of Tholstrup Cheese A/S, an innovative Danish cheese manufacturer, that ‘if the consumers want it, it is not new’ [Grunert, Harmsen, & Göransson, 1997, p. 68].) The object of developments such as kebabs was to gain “a foothold into a new area which can then expand further for us, as opposed to just trying to drive more of the same product out there.”

In light of the above, the economic gains of new product ideas have also to be gauged in terms of their potential to enhance opportunities for cross-selling: “[We also evaluate] how many of the customers are there because they can get [say] salmon kebabs from us. If they are getting kebabs from us then they are probably going to get their fillets from us as well. They could have got their fillets from another supplier, who couldn’t have given them kebabs.” In this context, the example of caviar was cited: “[Caviar] has very low volume sales, but the barriers to entry for competitors are very high. So through adding caviar to part of the range, … that allows us to leverage existing products over and above competitors into certain customers.”
Longevity of the product idea and corresponding potential for long-term stable growth is another consideration: “[NPD] is a strategic move. It is not like putting a new product out there expecting to make a big win for 6 months, 18 months; then it’s dead. And then looking for something else. We are looking for longer-term stable products that just keep growing the use of our core product [fresh chilled farmed king salmon].”

As far as product ideas for exports are concerned, “We don’t want to take the risk [of] taking a new product to the market when we don’t have a customer base for [it]… That’s a very expensive process for an exporter to do… Export new product development projects will emphasise customization for known demand… We tend to work with customers in Japan to develop what they want.” (This could be a product that someone else supplied to the market.)

**ORGANIZATIONAL STRUCTURES & MANAGEMENT SYSTEMS**

For a fuller discussion of cross-functional teams and costing for NPD, the reader is referred to the author for a complete report. We note here that in terms of measuring the effectiveness of the NPD effort, NZKS monitors the percentage of sales realized from products that have been developed in the previous 12 months, for which a challenging target is explicitly stated in NZKS’s strategic plan. NZKS also has a tight target time-to-market for each new product idea. At any one time, NZKS has about 15 ongoing developmental projects with a “pretty good” success rate.

**SUMMARY**

We have described innovation at NZKS with an emphasis on value-chain innovation in the production of raw material (king salmon), processing, marketing, and distribution. At NZKS, innovation as described above speaks to each of the four attributes cited by Grunert, Harmsen, Meulenberg, Kuiper et al. (1997, pp. 5-6): ‘innovation quality’ (number of successfully marketed new products, new product sales as a percentage of total sales, contribution of new product sales to cash-flow or profits); ‘innovation capacity’ (R&D expenditure as a percentage of total sales, complemented by evaluations of the organization of innovation in the company, such as the relationship between marketing and R&D and other aspects of market-orientation); ‘willingness to innovate’ (an element of the corporate culture that can be related to general management’s
stimulation of innovativeness by fostering flexible organization and avoiding bureaucracy in the company and by stimulating and adequately rewarding innovative employees), and ‘innovation speed,’ which refers to the speed of the NPD process.

Given the business imperatives at NZKS of investment in both production research and developmental research, NZKS would appear to be a particularly appropriate company to study in light of the thrust of the ongoing FRST project. Another aspect that sets NZKS apart in terms of the intensity of its R&D effort relative to other NZ seafood companies is its focus on differentiation away from commodity markets. This focus is heightened by the prevalence of a related species that is considerably easier to farm (Atlantic salmon).

Figure 1 presents a process model of value-chain innovation that is induced from case study data. It shows how innovation and development ultimately proceed from the competitive strategies of NZKS, and how they enhance the bottom-line performance of the firm. Such a model would be particularly relevant to integrated niche aquaculture firms, such Icy Waters Ld., which has become the premier Arctic char facility in the world (NRC, 2001). Most of the links in the diagram would be apparent from the preceding discussion of NZKS. The link showing NZKS’s strategic goal of differentiation through quality and reliability as being a driver of production research arises from the need to design fish that have various attributes of quality as well as the need to achieve reliable, year-round supply of fresh, chilled king salmon.

It is worth contrasting the findings from NZKS with those from case studies of product and process innovation in the food industry at large (e.g., Grunert, Harmsen, Meulenberg, & Traill [1997], Harmsen et al. [2000], Traill & Meulenberg [2002]). These studies drew similar conclusions from the same body of data; hence, we focus on one of them, namely, Harmsen et al. (2000). While developing their revised model of innovation success in low-tech companies (e.g., the food industry), Harmsen et al. (2000) elaborated on three types of company orientations (i.e., core competencies), namely, product, process, and market. In Harmsen et al. (2000)’s perspective,
product orientation “has to do with respect for the product manufactured, an emphasis on pride of craftsmanship, an emphasis on product quality, even a positive emotional attachment to the products” (p. 157). The earlier noted Tholstrup Cheese is deemed to have a product orientation; the company is characterized as being “in love with cheese” (Grunert, Harmsen, & Göransson, 1997).

In a company with a process orientation, the usual terms of reference are not a set of products manufactured, but a set of processes; “production units, not products, are what are to be optimized, and are consequently also the focus of innovation.” According to Harmsen et al. (2000, p. 157), the process-oriented company “emphasizes efficiency, cost management, and thinking in terms of the whole food chain, not just the manufacturing step.” Market orientation has several elements, namely, focus on the customer, external orientation, focus on being responsive to customers, and focus on more market players (e.g., competitors) than just customers.

According to Harmsen et al. (2000, p. 157), “a major difference between orientation and competence is that competencies, or part of them, can be outsourced, whereas orientation cannot.” Further they believed that “a company will mainly be driven by one of the [three] orientations,” which would also influence and direct the acquisition of the remaining supplementary competencies (p. 159).

Our data from NZKS appear to be at variance with the findings of Harmsen et al. (2000) in that no one possible orientation is clearly more dominant than the other two; rather, the product and process orientations are intertwined. In turn, this departure can be attributed to both the niche nature of the industry (i.e., king salmon as opposed to Atlantic salmon) and the vertically integrated nature of the firm (which arose partly due to a lack of external competencies).

To begin with, ‘product’ in an integrated firm such as NZKS has multiple connotations; it denotes both “value-added product” (e.g., salmon dips) and the “core product” (i.e., whole fresh chilled, farmed, king salmon). With reference to the latter, NZKS does manifest deep ‘respect for the product manufactured’ and ‘an emphasis on product quality,’ as witnessed in its steadfast focus on a single species (king salmon) that it believes is “a great product with very identifiable
attributes” for which there are discerning customers who will be willing to pay a premium. This is clearly a deep-rooted orientation in the company.

Equally, especially in comparison with other larger seafood companies in NZ that have easier access to raw material (e.g., by hunting and gathering), NZKS has “needed to be quite smart in what we have done and the way we have developed the processes.” Thus, “[process] yield is very important to [NZKS] because of the cost of getting the fish out of the water in the first place [and the risk that] within a few hours you can destroy the value of that product … [e.g.,] by slicing it the wrong way.” At NZKS, a process orientation appears to naturally fall out of a product orientation that is defined with reference to the “core product” (indeed, the product-process split in the developmental effort at NZKS is 50/50). For the same reason, continuous improvement programmes at NZKS are mature compared to some of the larger seafood companies in NZ; coupled with process innovation (e.g., steam pasteurization), they help NZKS realize its strategic goal of differentiation through quality. Similar to the firms deemed by Harmsen et al. (2000) to have a process orientation, NZKS does think ‘in terms of the whole food chain.’ However, its supply-chain thinking proceeds not so much from cost considerations as from a focus on fresh chilled salmon and the concomitant need to ensure “salmon reaches local and international markets in perfect condition” (Anonymous, 2001). (As noted earlier, a notable difference between salmon aquaculture and other agricultural sectors is the comparatively greater degree of perishability of fish, and consequent greater need for investment and coordination in the supply chain to preserve product quality [Tveterås & Kvaløy, 2003].)

In relation to the frameworks of Harmsen et al. (2000), NZKS’s success can be explained by the confluence of product and process orientations and market competences that the firm has progressively sought to acquire. One means of acquiring such competence has been to move the locus of NPD into marketing away from processing. Another has been to select a key marketing manager with a solid background in the FMCG sector.
On the basis of the findings from NZKS, as summated by Figure 1, a few propositions may be tentatively advanced as a ‘takeaway’ for further research into seafood companies. Depending on the locus of a firm in the value chain, some propositions may not be appropriate, i.e. a company that solely harvests, say, mussels, may not engage in new product development that uses mussels as raw material.

1. Greater the strategic focus on differentiation away from commodity markets, greater the investment in new product development.
2. Greater the strategic focus on differentiation through quality, greater the investment in new process development and continuous improvement.
3. Greater the cost of harvesting a unit of raw material, greater the investment in R&D in by-product utilization.
4. Greater the cost of harvesting a unit of raw material, greater the effort involved in continuous improvement and innovation in processing and distribution.

[The following may be applicable only for aquaculture.]
5. Longer the maturation cycle of the species, greater the investment in production research for that species.
6. Greater the seasonality in the maturation cycle of the species, greater the investment in production research for that species.

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Differentiation away from commodity markets

NPD research (including by-product utilisation)

New process development

Continuous improvement programmes

Focus on one species

Species characteristics

High unit cost of raw material

Production research

Standardisation

Continuous improvement programmes

Improved processes in manufacturing and distribution

Better ways of growing “raw material”

Introduction of new products

Revenue and bottom-line growth

FIGURE 1: A Process Model of Value-chain Innovation at NZ King Salmon.