Competitiveness in a Resource Dependent Region: The Case of Food Processing in Canada's Maritime Provinces

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Canada's Maritime provinces (Nova Scotia, New Brunswick and Prince Edward Island) have long been identified within Canada as a have not region. Although there are indications that the region has begun to close the gap over the past 30 years (Milne and Tucker 1993; and Savoie 1992), in many regards the future of its resource based economy is in more question now than it has ever been. There are three challenges facing the Maritimes' economy. First, the region's limited resource base has not provided an acceptable level of income or employment.(1) Second, commodity production is inherently vulnerable to outside competition, and the liberalization of North American and world trade is expected to increase competition further. Third, the nation's ability to financially support the Maritimes will become increasingly difficult as federal and provincial governments are forced to address their debt problems. These economic problems are not unique, but are similar to those of other lagging regions of Canada (for example, Eastern Quebec and Northern Ontario) and the world (for example, Southern Italy and parts of Scotland and Wales). Therefore, the conclusions drawn here may have implications beyond the Maritime provinces.

In order to reduce regional disparities the federal government has implemented a series of regional development programs since the late 1950s (for detailed reviews of these policies, see Savoie 1992). Although these initiatives have included a wide array of policies, the most consistent policy instrument has been industrial incentives. However, on balance these policies have been viewed as being ineffective (O'Farrell 1990; Savoie 1992; Milne 1995) and do not address the structural problems facing peripheral regions (Meyer-Krahmer 1985). This has led some to argue that policies should be oriented towards the promotion of pre-existing industries (Savoie 1992; Meyer-Krahmer 1985). That is, the focus should be on industries that draw their competitive strength from the region's inherent advantages.

In effect, this relies on the resource sector as a source of development, but this is increasingly difficult to achieve. However, it is possible to encourage economic development without changing the region's economic base. Products produced for commodity markets tend to be low value added and those produced for product markets

high value added. Higher value added to the region's resource production holds the promise of greater income and employment for the region as a whole.

Yet, there is evidence to suggest the region has been unable to add significant value to its resource output (APEC 1987; McMillan 1989). For example, how do firms that produce high value added production differ from those producing low value added? Have firms which produce high value added products been more successful and, if not, why not?

This paper uses the methodology of a mail survey which covers the region's food processing industries to consider the strategies they relied on to be competitive. The food processing industry was selected for two reasons. First, it represents an industry that has long been an important part of the region's economy. Second, it includes firms who sell to both commodity and product markets. The differences between the operation of these firms can provide insight into the causes and constraints on the amount of value added to the region's resource production.

The results of the survey show that higher value added firms compete for different types of markets and rely on different factors and strategies to establish and maintain their competitiveness. However, the respondent's behaviour and performance does not fully reflect the factors they rely on or the competitive strategies they follow. There is also reason to believe there are constraints on the ability of the region's firms to pursue these strategies effectively and this, in part, explains the region's disparity in higher value added production.

This paper is separated into four sections. Initially, the theoretical context for the study will be outlined. Following this, the methodology is presented. The next section reports the results of the survey. Finally, a summary and conclusion is presented.

Theoretical Context

Porter (1990) argues that there are two potential ways firms can compete for markets: lower costs and differentiated products that command premium prices. Sustaining advantage depends, in part, on the source of advantage, which can be classified as lower or higher order. Lower order advantages are based on, for example, low inputs costs or economies of scale. These are often easily overcome by competitors because any source of lower costs, even if it is less sophisticated, will nullify the advantage. Higher order advantages tend to be longer lasting and are based on product differentiation, brand name reputation built on long term marketing efforts, sustained innovation in physical facilities, and often risky R&D and marketing. Advantages created through product differentiation must be matched to be exceeded.

Whether a firm relies on low or high order advantage, its ability to use them effectively depends in large part on the economic environment in which the firm operates. Porter (1990) argues that there are four determinants of national or regional competitive advantage: factor conditions; demand conditions; related and supporting industry; and

firm strategy, structure and rivalry.[(2)]

Factor Conditions

Porter defines factors of production as human resources, physical resources, knowledge resources, capital resources, and infrastructure. Competitive advantage is gained if a region's firms have access to low cost or unique, high quality factors. Factors can be classified as basic or advanced, and as generalized or specialized. Basic factors are inherited or take relatively little effort to create (for example, soil quality or climate). They also tend to be most important for primary industries. On the other hand, advanced factors (for example, highly skilled employees) are much more difficult to develop, as they are created through sustained investment in human capital. However, they are necessary for the development of higher order competitive advantage. Generalized factors can be used by many industries, and include highway infrastructure, capital, and motivated, educated employees. Specialized factors, on the other hand, tend to be important for just one or two industries. Generalized factors, like basic, are sufficient for lower order competitive strategies, however specialized factors are often required for higher order advantage.

Demand Conditions

Home demand is most effective as a determinant of competitive advantage when it has one or more of the following characteristics: it emphasizes market segments that are more global than others; buyers are sophisticated and demanding; and home buyers' needs anticipate those of other nations. All of these alone, or in combination, will assist or push local firms to be competitive beyond their regional markets. The size of home demand and its rate of growth can also affect the extra regional or international competitiveness of firms. If the industry is characterized by large scale economies, high R&D expenditure, large leaps in technology, or high levels of uncertainty, a large home market can provide a competitive advantage. In addition to size, if home demand is growing quickly competitive advantage may be gained by the quick introduction of new technology, and investment in large more efficient facilities.

Related and Supporting Industries

The presence of internationally competitive related and supporting industries also provides advantages to the region's industries. Successful supporting industries can provide access to more cost-effective inputs. In addition, close contact between suppliers and buyers allows more information interchange, and, thereby, enhances the process of innovation and upgrading for both the supplier and the downstream industry. Related

industries can be defined as those which coordinate or share activities with the industry in question, or have complementary products (for example, computer hardware or software makers). Like supporting industries, related industries provide information flow and technological interchange. If related industries have been internationally successful, they can also provide a pull for similar industries, and particularly for ones which are technically interdependent. The success of American computer companies abroad acted as a pull effect on related software and hardware producers.

Firm Strategy, Structure and Rivalry

Porter argues that the strategy and structure of an industry depends to a large degree on national circumstances. For example, Italian firms tend to be small and centred around the family or extended family. As a result, Italian firms tend to be most successful in fragmented industries with modest economies of scale, or economies of scale which can be overcome by coordination among firms. German firms tend to have a strong hierarchy with senior managers who have technical skills. These firms are inclined to be most successful in industries which produce technically complicated products.

Domestic rivalry also plays a strong role in determining which firms will achieve competitive advantage. Domestic rivalry, more than competition from foreign firms, pushes competitors to innovate and upgrade their competitive advantage. Domestic firms have access to the same advantages (for example, low labour costs), forcing them to seek other competitive advantages, often of higher order, to maintain their position. This competition makes it easier for domestic firms to compete in international markets, and often acts as a push factor.

These four overall determinants of competitive advantage are all linked together. Without strength in most determinants, an industry will not be competitive in the long term. For example, a new innovative product that is initially competitive in international markets may lose market share over time because of a lack of competitive related and supporting industries to support continued innovation.

Methodology

The data presented in this paper were collected using a mail survey of the population of food processors (550 firms)..[(3)] The survey was designed to identify low and high value added firms as well as to gather information on their growth rates, spending and investment patterns, resource inputs and what strategies and factors they relied upon to be competitive. Two mailings were conducted in the fall of 1992 and resulted in an overall response rate of 29%. The responses rates were Prince Edward Island, 36.3%, Nova Scotia, 33.2%, and New Brunswick, 23.0%.[(4)]

The questionnaire was constructed around factors hypothesized to affect the competitiveness of food processors in the region. Included among these factors were:

- capital and labour inputs;
- quality and supply of the resource;
- causes of growth and sources of demand; and
- the factors and strategies which processors relied on to be competitive.

One of the most important parts of the questionnaire design was defining appropriate indicators of value added. Indicators were used instead of direct measures for several reasons. First, since a large number of respondents did not have computerized accounting systems, calculating value added would have been difficult and time consuming. Second, because many firms in the sample are privately owned, they would not be as forthcoming with detailed financial information. Finally, even if available, only an aggregate measure of value added for the whole firm could be obtained. However, many firms produce both low and high value added products. This information would be lost in an aggregate measure. Therefore an indicator of value added had to be defined.

Porter's (1990) value chain provides a conceptual basis for defining the indicators. Each link in the chain (inbound logistics, operations, marketing and sales, outbound logistics and after-sales service) creates value for the customer. Value is not only added at the processing stage (operations), but at all the other steps along the chain. This implies that there are two ways of adding value to inputs: creating value through the physical transformation of inputs; and, by such functions as inbound and outbound logistics, marketing and sales, and after-sales service. For example, a firm which makes frozen fish dinners can sell their product to institutions, or as a brand name product through retail stores. However, the processor will be able to sell the dinner at a higher price to the retail store. Processing has nothing to do with the higher level of value added. Similarly, if a fish processor can guarantee it can cut and transport high quality fresh fillets to market, it can sell that fish fillet for a premium price. The price is based on quality and not processing. The firm's ability to ensure quality is closely linked to inbound logistics, good storage and handling, and outbound logistics. What links both of these examples is the idea that value is being added, at least in part, through non-price marketing strategies (for example, brand name and quality). Therefore, in addition to processing, firms can add value through other parts of the value chain that are associated with non-price marketing strategies; what might be more succinctly termed product differentiation strategies.

Table 1 illustrates the relationship between processing, marketing strategies and value added. Low value added is associated with low processing and price competition. High value added is likely to result from high processing and/or non-price competition. Each firm was asked what percentage of their production was low processed and what percentage was marketed through a price strategy.

TABLE 1 Indicators of Value Added

However, a high percentage of low processing does not mean the firm's products are low value added, since they may be marketed using a non-price strategy. Similarly, following a price competition strategy does not necessarily indicate lower value added if the firm is following a high processing strategy. Therefore, conceptually, both indicators of value added are required.

Since the purpose of the survey was to determine the attitudes and behaviours of low and high value added firms, the responses obtained from the questions tended to be nominal or ordinal in nature. In order to test hypotheses using these data, the Kolomogorov-Smirnov test (K-S test) of significance and the concordance-discordance (C-D test) were used (see the Appendix). The K-S test was used for cross-tabulations of nominal-ordinal data, and the C-D test was used for ordinal-ordinal cross-tabulations. In addition, will be used to indicate association (where =1 or -1 indicates perfect association and =0 indicates independence as noted in the Appendix) and for statistical significance.

Empirical Results

The competitive strategies followed by firms can be logically associated with the degree of value added to the resource as indicated in the previous section. Based on the survey data, it will be demonstrated that higher value added firms tend to sell their products based on different firm and product characteristics. They also have different factor requirements and use different tactics to achieve competitive success. It will also be shown that although higher value added firms would be expected to experience higher growth rates, this is not the case. In part, this can be explained by weaknesses in the determinants of competitive advantage.

Basic Characteristics of the Sample

There were a total of 159 usable questionnaires, of these 78 were fish processors and 80 were agrifood or beverage processors.[(5)] The surveyed firms employed a total of 21,950 full and part-time, and/or seasonal employees. Approximately 14,000 of these were employed by fish processors and 7,500 employed by agrifood-beverage processors. The number of full time emp-loyees, however, was about the same for both. In general, the sample can be characterized as consisting of a large number of small and medium sized firms, with the median firm having 30 employees. However, in terms of total employment the sample was dominated by the larger firms, with the top 10 firms employing 60% of all the workers in the sample. Fish processors tended to be larger, having an average and median employment about twice that of agrifood-beverage processors. Most of this difference, however, is due to a greater reliance on part time/seasonal labour by fish processors. In terms of revenues, 64% of the firms had annual sales of more than a million dollars, as shown in Table 2. When the sample is broken down into fish and agrifood-beverage processors, fish processors tended to be larger with a higher percentage having sales of $1 million or more.

The respondents were also asked to estimate their average sales growth or decline over the past 5 years. A large majority of firms grew over this period and approximately half the respondents grew at an annual rate of greater than 10%. Only 10.3% of the respondents reported declining sales over the period. Therefore, overall, the sample had relatively high growth rates.[(6)]

Indicators of Value Added

The firms were asked to identify what percentage of their production involved a minimum amount of processing. This is shown in Table 3. A majority of the processors (65%) had over half of their sales in products that were low processed. This was particularly true of fish processors, where greater than 80% sold more than half their production as low processed products. Agrifoodbeverage processors were evenly split between firms who sold a majority of their production as high processed products and low processed products. The sample was also bimodal; firms tended to specialize as either low or high processors.

TABLE 2 Annual Firm Sales

TABLE 3 Percentage of Production Which Involves a Minimum Amount of Processing

As with low and high processing, the firms were asked to identify what percentage of their production was marketed based primarily on price. Unlike the processing strategies, the distributions tended to be more evenly spread, reflecting a greater ability for firms to follow one or the other strategy depending on the product. Roughly half of the firms sold more than 50% of their production primarily on the basis of price as can be seen in Table 4.

TABLE 4 Production of Products Marketed Primarily in Terms of Price

Fish processors tended to rely to a greater degree on a price strategy, with 60% of the firms having greater than half of their production sold under a price strategy. For agrifood-beverage processors only 43% relied on a price strategy.

Overall, there is a significant amount of higher value added production taking place. However, the sample was dominated neither by low nor high value added firms.

Before presenting the rest of the results, it is useful to understand the relationship between the two indicators of value added. There was a significant positive correlation (= 0.28) between the degree of low processing production and the degree of production sold under a price competition strategy. Those firms that sold all their production on the

basis of price were very unlikely to produce highly processed products and, in general, only a minority of the processors, 22%, sold more highly processed than non-price production. On the other hand, firms who sold all their products through a non-price competition strategy were about as likely to produce low, as high, processed products. Therefore, adding value through a non-price strategy, unlike high processing, can stand on its own, and as such will take priority in the analysis.

Product and Firm Marketing Characteristics

The processors were asked to rate the importance of various product and firm qualities for product sales depending on whether the product was sold through a price or non-price marketing strategy. If a firm produced both, price and non-price products ratings were given for both. These product and firm qualities include: the product's price; its uniqueness; brand name; quality; company reputation; and service to customers. Excluding price, it would be expected that non-price competitors would rate these qualities higher than price competitors. In other words, such factors as a product's brand name, or its uniqueness would be used by non-price competitors to differentiate their products. Based on the results of the survey, this is largely the case. Non-price competitors rated factors such as, unique product, brand name, quality and service to customers significantly higher. In addition, non-price competitors rated price significantly lower, as shown in Table 5. For both packaging and company reputation there was no significant difference, but both tended to be rated higher by non-price competitors. If the sample is disaggregated between fish and agrifood-beverage processors, the same general pattern emerges.

There are two conclusions that can be drawn from these results. First, they generally confirm the hypothesis that price and non-price competitors rely on different product characteristics for their sale. Second, and perhaps more critically, these different product and firm qualities have implications for the operation of the processors. Firms focus on different parts of the value chain depending on the products they are producing. Non-price competitors may spend more on outbound logistics to get their product to market on time, marketing and sales to find and maintain markets, and technology development to produce new products. On the other hand, price competitors may focus their attention on reducing procurement and operations costs.

Distribution Channels

If processors are selling their non-price products based on different product and firm characteristics, then these products may also flow through different distri-bution channels. Highly differentiated products tend to be sold by retailers, while the least differentiated products are sold to other food processors (Connor et al. 1985). In this case, the respondents were asked what percentage of their sales flowed through each

distribution channel. Therefore, to determine the ef-fect of greater non-price sales, the percentage of non-price production was cross-tabulated with the percentage of sales through alternative distribution channels.

Firms with greater non-price production are more likely to sell directly to consumers or through retail stores as presented in Table 6 and this supports the conclusions of Connor et al. (1985). Fish processors with more non-price production were also more likely to sell through wholesalers/distributors. Usually these fish are sold to final demand and often under another firm's brand name (Apostle et al. 1992). Non-price firms are much less likely to sell their production directly to other food processors, or through brokers/traders who often sell to other processors (Apostle et al. 1992). These results tend to confirm the contention that non-price firms emphasize such activities as outbound logistics, and marketing and sales, which are more important functions for sales to retail stores than to other food processors.

TABLE 5 Rating of the Importance of Product/Firm Characteristics for Product Sales (on a Scale of 0 to 9), Price/Non-Price Strategies (K-S Test)

TABLE 6 Effect of Greater Non-price Production on the Importance of Distribution Channels (C-D Test)

Success of Product Differentiation

Have non-price firms' product differentiation strategies been successful? Have the firms differentiated their products enough to target markets? When the processors were asked how many competitors they had for their price and non-price products, the majority of non-price products had fewer than five competitors, while 75.0% of price products had more than 5 competitors (= 0.001). Firms also felt they had a greater degree of control over non-price product prices: price marketed products had an average rating of 3.68 on a scale of 0 through 9, while non-price competitors rated it at 5.59 (= 0.001). If the sample is disaggregated by fish and agrifood-beverage processors the same basic pattern emerges. As an aside, the greater control over price by non-price competitors would appear to reinforce the contention that this is an indicator of value added, since it is more likely they would be able to charge a premium for their products.

Factors Affecting Competitiveness

The respondents were also asked to rate the importance of several factors that contribute to their firm's competitiveness. Since, in this case, the questions related to each firm as a whole, there was no specific breakdown for ratings of price and non-price products. The

highest rated factors were high quality products, good quality resources, knowledge of customer needs, and access to low cost resources. The lowest rated were access to specialized services and the ability to innovate new products. In large part, the highest rated factors appeared to be the ones that were closely linked to the resource. While those factors that are often associated with the development or processing of products tended to be rated lower. This would appear to reinforce the perception of Maritime food processors as commodity, rather than product, producers (see, for example, O'Farrell 1990). In other words, basic factors like low cost, or good quality resources, were rated highly, while more advanced factors like access to specialized services, and skilled and highly skilled employees were rated lower.

The factor ratings were cross-tabulated against the percentage of production sold through non-price marketing strategies for each firm as shown in Table 7. At first glance, the most notable characteristic of the table is the large number of statistically significant results for All Firm and Fish Processing categories, while there is only one for Agrifood-beverage. Agrifood-beverage processors, with greater non-price production, appear to see little difference in the importance of the competitive factors compared to those with greater price production.

Looking more closely at the results some patterns emerge. First, greater emphasis was placed on access to low cost resources by firms with more price competitive production. Logically, firms that rely on their product price would tend to be more concerned about the cost of the resource than firms which sell their products based on other factors. Second, those firms with a larger percentage of non-price product sales rated access to specialized services, closeness to main markets, knowledge of customer needs, and the ability to innovate new products as more important factors. With the exception of closeness to main markets, these factors would be associated with firms trying to differentiate their products from those of competitors. These specialized factors would also support higher order competitive advantages. Third, there was no significant difference in the ratings for access to skilled and highly skilled employees.

TABLE 7 Effect of Greater Non-price Production on the Rating of Factors for Firm Competitiveness (C-D Test)

This result is somewhat surprising since firms who rated product innovation and market knowledge more important would be expected to also feel the same about skilled and highly skilled employees. However, there was a significant positive association for fish processors. Fish processors also found access to affordable financing more important. This may be an indication of a greater need for capital with increased non-price production. Good quality resources and high quality products were rated highly by all firms, making it difficult to identify any significant variation between price and non-price competitors.

Competitive Strategies

The respondents were also asked to rate the strategies they might follow when faced with increased competition for markets, and/or increased costs in accessing them. The firms rated looking for new markets, and the reduction of overhead costs highest as strategies to maintain their competitiveness. These strategies were also the ones with the least variation, indicating less disagreement across the firms compared to the other possible strategies. The more complicated, higher order, strategies tended to be rated lower. For example, upgrading skills of employees and R&D were rated as moderately important.

As in the last section, the ratings were cross-tabulated with the degree of non-price production as shown in Table 8. Non-price competitors place greater emphasis on the purchase of new more efficient equipment, the introduction of new production processes, the introduction of quality control measures, research and development of new products, and the upgrading of employee skills. These strategies would tend to require much more sophisticated inputs in terms of services, labour and management skills, and capital. There would then be more emphasis in the value chain on human resource and technology development.

Also of interest, particularly when fish processors are considered, is the higher ratings for the more mundane strategies of reducing overhead costs and looking for assistance from government. Logically, price competitors would be more concerned about overhead costs, but this is not the case. It is also curious to see that firms that are willing to follow such sophisticated strategies also look to government for assistance. The greater reliance on government assistance, however, may be a reflection of the higher costs and possible risks involved in the production and marketing of non-price products.

Non-price competitors rely on different product and firm characteristics to market their products. They also have fewer competitors and have greater control over the price they charge. The product differentiation strategy non-price firms follow also affects the distribution channels they use, their factor requirements and how they react to increased competition. Non-price, higher value added firms then focus on different parts of the value chain. In addition, higher value added firms rely on more advanced, specialized factors, that support the higher order competitive strategies.

Comparison of Low and High Processors

The proportion of production that required high processing was also cross-tabulated with the ratings of factors and strategies respondents relied on to be competitive. The results reflect those based on the non-price indicator of value added. Only when the sample is disaggregated by fish and agrifood-beverage processors was there a substantial difference in the results. In this case, the associations for agrifood-beverage processors tended to be stronger. The reasoning for this is unclear, but it may be a reflection of agrifood-beverage processors placing greater priority on adding value through a high processing strategy.

TABLE 8 Effect of Greater Non-price Production on the Rating of the Importance of the Following Strategies to Counter Increased Competition (C-D Test)

Firms' Spending and Employment

To this point in the analysis, the emphasis has been on the effect of greater value added production on the judgements or attitudes of the processors towards different factors and strategies that might affect their success as a business. Whether these attitudes are reflected in the actual behaviour of the firm is still in question. The spending and employment patterns and the effect of higher value added production of processors are outlined below.

The respondents were asked whether they invested in new plant and equipment, product research and development, product promotion and employee training over the past 5 years. A relatively high percentage of firms, 43.4%, invested in new plants and not surprisingly over 90% of the firms have made some investment in new equipment. Over half the respondents made expenditures on product R&D, product promotion, and employee training.

The firms were also asked whether they had received financial assistance from government. What is most significant about these results is the potential influence government assistance may have on the investment and spending decisions of food processors. Between 40 and 60% of the firms who invested in one of the categories also received some form of financial assistance from government. However, it is difficult to assess the degree of influence because the firms were not asked how much assistance was offered. Nonetheless, the potential influence of government financial assistance is undeniable.

In addition to investment expenditures, the respondents were asked whether they employed persons who specialized in product promotion (marketing), product R&D, quality control and accounting/data processing. The majority of the firms employed persons in quality control (62.9%) and accounting/data processing (69.2%). Only a third, however, employed persons specializing in marketing. Few fish processors, in particular, employed marketers (23.1%). The lowest percentage employed workers in product R&D at 18.2%. The low employment in R&D is consistent with the conclusions of Marion (1986) and Connor (1988), that food processing firms, often regardless of size, are not R&D intensive. Most innovation comes from outside the industry.

The respondents were also asked whether they had contracted similar producer services from firms located in the Maritimes over the past 5 years. For product promotion, the number of firms using producer services was similar to employment (31.4%). A substantially larger proportion of the firms (38.4%) contracted out product R&D, which, in part, explain the relatively small percentage of firms with persons specializing in

product R&D. Contracting out for quality control and accounting/data processing accounted for 31.4% and 39.0% of the firms, respectively.

It might be hypothesized that higher value added firms would spend more on the purchase of new equipment, product R&D, product promotion, and employee training. In addition, higher value added firms would be more likely to employ persons or use the services of outside firms or organizations for product promotion, quality control, and product R&D. To test this hypothesis the two indicators of value added were cross-tabulated with the respondents' investment, spending and employment patterns described above.

The greater the proportion of a firm's sales that was non-price, the more likely a firm was to spend on product promotion (= 0.01) and employee training (= 0.02), but there was no significant difference for product R&D, new equipment or plants. The degree of highly processed production had a similar effect, except that employee training was not significant. The greater emphasis placed on product promotion and employee training agree with the hypothesis stated above. However, the lack of spending by higher value added firms on product R&D contradicts respondent's stated attitudes.

Higher value added firms are more likely to employ persons who specialized in product promotion than lower value added firms (= 0.01). There was, however, no significant difference for product R&D, quality control, and accounting/data processing. In addition, the greater the degree of higher valued added production had no significant influence on the use of services for product R&D, quality control and accounting/data processing. These results run counter to those above, which suggest that firms with more higher value added production rate access to specialized services as more important than firms with less higher value added production.

Effect of Higher Value Added Production on Growth

In the last section, the actual rather than the intended or implied behaviour of low and high value added firms was presented. The question to be answered here is whether higher value added firms experienced higher growth rates. There are theoretical and empirical reasons to believe that they should. Theoretically, the strategies higher value added firms rely on to establish and maintain their competitiveness are less vulnerable to competition and, therefore, these firms are more likely to experience higher growth rates. In addition, there has been a shift in consumer demand towards processed, high quality foods (Connor et al. 1985) that are typically high value added.

To test this hypothesis, the degree of non-price production and highly processed production was cross-tabulated with the firm's growth rate. Although, in almost all cases, the associations were positive, there were no significant results. Only in the case of high processing, for all firms and fish processors, were the results nearly significant. However,

the associations () at 0.12 and 0.14 respectively, were not particularly high. At best, it can only be inferred that there is a weak positive association.

Although their growth rates were not significantly different, low and high value added firms cited different reasons for their growing or declining sales. When the respondents were asked what caused their sales growth or decline, higher value added firms cited more often the introduction and improvement of products, and less often increased competition. Low value added firms tended to rely to a greater degree on the supply of the resources for growth and were more vulnerability to its decline (this was particularly true of low value added processors). These results would tend to confirm the views of the Economic Council of Canada (1977) and Porter (1991), that competition on the basis of undifferentiated commodities may not be a sustainable strategy.

Constraints to Higher Value Added Production

Regardless of the different causes of growth or decline, the overall outcome is the same. There is no statistically significant difference in growth rates of low and high value added firms. There are two possible reason for this. First, commodity producers, unlike product producers, do not require strength in all four determinants of value added. For example, access to low cost resources was rated significantly higher by low value added firms, while advanced factor inputs were rated lower. Second, the factors and strategies that higher value added firms rely on may not provide them with advantages that are well beyond those of lower value added firms. That is, there may be constraints on the provision of these factors or on the ability of higher value added firms to utilize them effectively. As the evidence above suggests, this type of production requires broader and deeper links with the region's economy, as well as contact with some of the forces that encourage firms to develop new products or enhance quality (for example, sophisticated demand and firm rivalry).

Factor Constraints

At the time the survey was constructed, it was hypothesized that there might be several factor constraints on higher value added processors. In particular, the availability of capital, access to, and the ability to keep, skilled and highly skilled labour, and a reliable good quality supply of the resource. The under-lying assumption was that higher value added firms relied to a lesser or greater extent on different factor inputs and, therefore, may be more vulnerable to the absence or quality of these inputs.

The surveyed firms were requested to rate (on a scale of 1-9) the willingness of private financial institutions to finance new equipment, product R&D, product promotion, and employee training. Only new equipment was rated, on average, above 5 (5.8). The generally low average ratings for product R&D (4.1), product promotion (4.3) and

employee training (4.2) would tend to disadvantage higher value added firms more than lower value added firms, since they rely to a greater extent on these activities to maintain their competitiveness. The ratings were cross-tabulated against both indicators of value added. In general, the fish processors with more high value added production felt private capital was more willing to finance their activities and the opposite was true of agrifood-beverage processors. Therefore, it would appear agrifood-beverage processors with higher value added production were at a disadvantage, particularly compared with fish processors.

The firms were also asked if they had difficulty finding or keeping unskilled, skilled and highly skilled employees. Over a quarter of the respondents answered yes for skilled (27.1%) and highly skilled (32.9%) employees, and 20% for unskilled workers.[(7)] For unskilled workers the most often cited cause was unemployment insurance (93.8% of respondents having difficulty finding or keeping unskilled workers). As the level of skill rose, unemployment insurance was of much less concern (4.8% of for highly skilled employees). The respondents were also asked to rate the importance of each type of employee to their firm's success. When cross-tabulated with both indicators of value added, highly skilled employees were rated significantly more important. An inability to find qualified employees can negatively affect a firm's operations because of lost production, as well as search and training costs. These costs are even more acute if turnover rates are high.

Finally, it was hypothesized that the resource in terms of its supply, seasonality or quality might have a greater negative impact on higher value added firms. For 39% of the respondents, their plant or plants were shut down 3 months or more of the year because of inconsistent supply and/or the seasonality of the resource. In general, higher value added firms felt that they could rely on a consistent volume of the resource better, and that they were less likely to be seasonally shut down (in both cases the results were significant for the high processing indicator of value added with = 0.01 and 0.001 respectively). Inconsistency, or seasonality, of supply then might not be seen as a major obstacle to higher value added production. However, firms that follow a high processing strategy are likely to have higher fixed costs. This provides a strong incentive to have access to the resource year round. Therefore, firms may be restricted since the resource is not available on a consistent, year round basis.

The vast majority of firms considered the quality of their raw material supply as good or very good (90.1%). Therefore, quality of the resource appears not to be a major concern. However, for the fishery, O'Farrell (1990) and Apostle et al. (1992) have noted the quality of some fish products from Nova Scotia have tended to be low, and this, in part, can be attributed to harvesting and handling procedures before the fish arrives at the plant (O'Farrell 1990). The higher percentage of fish processors rating the resource quality as moderate (12.5% versus 7.8% for the sample as a whole) provides some evidence to support O'Farrell's findings.

Weaknesses in Other Determinants of Competitive Advantage

It is difficult to assess the strengths or weaknesses of the other determinants based on the survey data. However, some comment can be made based on other sources of information on home demand conditions, related and supporting industries and, to a less degree, firm rivalry.

One of the most important attributes of home demand is whether it anticipates, or is similar to, international demand. The evidence is, at best, incomplete, but there are some clues. For example, as noted in O'Farrell (1990), Nova Scotia has the highest consumption of milk per capita in Canada, but the lowest consumption of higher value milk products (for example, yoghurt). There is, therefore, less incentive for local dairies to develop high value products that might be marketable nationally or internationally. The same can be said for salt fish. Most salt fish is consumed by ethnic consumers (primarily from the Caribbean) in the United States. Nova Scotia processors have lost the higher end of the market, and have only been competitive in the lower quality, low priced products (Apostle et al. 1992). There are explanations for such problems, but a competitive domestic market for high value products would have prepared processors much better for international markets.

The regional market is also small, with less than two million consumers. In an industry where scale economies are often important, particularly in terms of advertising, market size may have restricted development.[(8)]

Supporting industries for the Maritime food processing sector and those related to it have a relatively weak presence. For example, Canada's small international presence in processing and packing equipment industries puts the Maritime processing industry at a disadvantage (Porter 1991). This is all the more important when we consider the importance of such industries for innovation (Marion 1986; Connor 1988). In addition, as MacDonald (1991) has found, with the exception of the Halifax area, the Maritime provinces are far below the Canadian average for the location of business services.

There is little direct evidence of the effect of firm rivalry on success of higher value added firms. Based on the results of the survey, it would appear that non-price competitors do have fewer competitors. However, in very few cases were there are no competitors in a market. There is some potential for rivalry. On the other hand, the sample, although largely consisting of small firms, is dominated in weight by larger firms, which would appear to reduce the likelihood of firm rivalry. However, the rivalry between very large firms like McCain Food and Cavendish Farms is common knowledge.

Therefore, it would appear demand conditions are relatively weak, related and supporting industries, often sources of innovation for food processors, do not appear to have a strong presence, and although there is some firm rivalry, it is unclear how effectively rivalry has pushed firms to become more competitive.

Conclusions

As noted in the introduction, little progress has been made in reducing regional disparities over the past 30 years. One possibility to narrow the gap may be a shift in regional policy towards encouraging indigenous industries. This change in direction ultimately leads to questions of development within the resource sector and, in particular, development through increased value added to the region's resources. The primary objective of this paper has been to better understand the differences between high and low value added firms and based on this to provide some understanding of why the Maritime provinces have been unable to add more value to its resource production.

The results of the survey indicated that there are clear differences in what firm and product characteristics high value added processors rely upon to sell their products. In effect, higher value added firms are focusing on different parts of the value chain to add value to their material inputs. These firms also use different distribution channels to serve different types of buyers with different needs. If higher value added firms emphasize different parts of the value chain then it was logical to argue they would rely on different factors to be competitive. This was largely true and, in addition, the factors that they relied on tended to be more advanced. These advanced factors are needed to support the higher order strategies that higher value added firms identified as important. However, it was also found that the behaviour of food processors did not fully reflect what they thought were important strategies. The results appear to imply that although higher value added firms see investing in product R&D or spending on quality control as important, these intentions are not realized in practice.

The survey also showed there was no statistically significant difference in growth rates of low and high value added firms. The constraints to growth identified in the survey were largely related to availability of factors of production. There were also constraints that might be associated with other determinants of competitive advantage. First, demand may not anticipate, nor mirror, demand in other regions. Second, related and supporting industries appear to be weak. Finally, it is unclear whether there is an effective level of rivalry to drive the system.

Regardless of the benefits of greater value added, implementing policies to encourage it promises to be a formidable task. The most certain conclusion we can make about policy is that traditional policy solutions to regional development problems will be ineffective if the objective is to encourage higher value added production. As Porter (1990: 682) states, "The quick, easy roles of government (subsidy protection, macroeconomic management) are either insufficient or counter productive". If a firm is producing a low value semiprocessed commodity, policies to reduce factor costs (for example, resource costs) may be effective, however, this strategy would be largely ineffective for a firm which is producing a product for final demand. In fact, if such a policy were in place, the government may be providing a disincentive for firms to shift from low value added commodities to higher value added products. As has been established above, the requirements of these firms are different and often more complex. Higher value added firms tend not to sell solely on the basis of price, but use such product qualities as brand

name or product uniqueness to gain market share. Higher value added firms tend to require the support of all the determinants of competitive advantage to be effective competitors. The implications of this are clear. Government policy should be oriented towards strengthening all determinants.

This, of course, implies orienting government policy towards improving demand and factor conditions, encouraging related and supporting industry, and firm rivalry. It is clearly impossible for any government to create these advantages and as such encouraging 'value added' industry to locate in the region is folly. However, if initiatives are directed toward indigenous industry, where many of the determinants are already in place, policy can be directed towards improving what already exists. For example, governments can encourage curricula and research which is oriented towards the industries of the region. In addition, by setting high quality standards for government procurement, demand conditions can be improved. Related and supporting industries can also be identified and encouraged through similar measures. Finally, firm rivalry can be assisted by prohibiting excessive industry concentration and ensuring all government contracts are tendered.

Past regional policy directed towards the Maritimes has tended to be *ad hoc* and oriented towards direct incentives to business (O'Farrell 1990). If anything, the results of this paper appear to call for a much broader, more coordinated approach to development.

Appendix: Concordance-Discordance Measure of Association

TABLE A.1 Cross-Tabulation of the Importance of R&D and the Level of Value Added

Much of the data set can be analyzed using the Kolomogorov-Smirnov test (K-S test). However, in several instances the cross-tabulated variables were both ordinal. Although there are other options (for example, the Chi-square and the Kruskal-Wallis H test), the concordance-discordance test (C-D test) proved to be a simple and effective method of analysis. The following explanation of the C-D test is based on Agresti (1984).

The C-D test is based on calculating the number of concordant and discordant pairs of observations in an ordinal-ordinal cross-tabulation. A pair of observations is concordant if the member that ranks higher on the Y variable also ranks higher on the X variable. To illustrate this, Table A.1 gives a fictitious cross-tabulation similar to that used in the analysis. In this example, the hypothesis would be that firms that add more value to their inputs (the X variable) would rate higher than the importance of R&D (the Y variable) for firm success. A pair of individual firms, for example, would be concordant if one rated both categories low and the other rated both moderate. Companies which rated both categories low would form concordant pairs with those companies who rated both moderate. The number of concordant pairs for these two cells would be 40 x 36 = 1440.

Those 40 firms who rated both low would also be concordant with those firms who had a moderate level of value added and rated R&D high (40 x 25).

The same pattern can be followed for all possible concordant combinations and this process can be expressed mathematically by equation (1).

$$C = \sum_{i<k} \sum_{j<l} n_{ij} n_{kl} \qquad (1)$$

where *C* is the total number of concordant pairs, n_{ij} is the number of observations in the reference cell *ij*, and n_{kl} is the number of observations in cell *kl* concordant to *ij*.

A pair of observations is discordant if the member that ranks higher on the Y variable ranks lower on the X variable. The number of discordant pairs can then be calculated using equation (2):

$$D = \sum_{i<k} \sum_{j>l} n_{ij} n_{kl} \qquad (2)$$

where D is the total number of discordant pairs.

The most general measure of association used with the C-D test is gamma (), given by

$$\gamma = \frac{(C-D)}{(C+D)}, \quad -1 \le \gamma \le 1 \qquad (3)$$

This implies that if = 1 or -1 there is a perfect association, and if = 0 the two variables are independent.

To test for the significance of the associations the *z* test statistic is used. The *z* score is given by

$$z = \frac{(C-D)}{\sigma\ (C-D)} \qquad (4)$$

where

$$\sigma^2\ (C-D) = \frac{[1-\sum_{i=1}^{n} p_{i+}{}^3][1-p_{+j}{}^3]n^3}{9} \qquad (5)$$

where, n is the sample size, p_{i+} is the ratio of column totals to the n, and p_{+j} is the ratio of row totals to n. Agresti (1984) notes that large random samples of $C-D$ have shown to be approximately normally distributed, and therefore a large sample test of independence can use the z test statistic. As a rough guide for the use of the normal approximation both

C and D should exceed 100. This is easily surpassed with the sample size obtained from the survey.

References

Agresti, A. 1984. *Analysis of Ordinal Categorical Data*. Toronto: John Wiley and Sons.

APEC. 1987. *Atlantic Canada Today*. Halifax: Formac Publishing Company Ltd.

Apostle, R. A., G. Barrett and L. Mazany. 1992. "Supplying the US Northeast", in R.A. Apostle and G. Barrett (eds.). *Emptying Their Nets*. Toronto: University of Toronto Press.

Connor, J. 1988. *Food Processing: An Industrial Powerhouse in Transition*. Toronto: D.C. Heath and Company.

Connor, J., D. Heien, J. Kinsey, and R. Wills. 1985. "Economic Forces Shaping the Food-Processing Industry". *American Journal of Agricultural Economics,* 67: 1136-1157.

Economic Council of Canada. 1977. *Still Living Together: A Study of Regional Disparities*. Ottawa: Ministry of Supply and Services.

MacDonald, W. S. 1991. "Structural Change in the Economic Base of the Maritime Provinces". *Canadian Journal of Regional Science*, 14: 129-142.

Marion, B. 1986. *The Organization and Performance of the U.S. Food System*. Toronto: D.C. Heath and Company.

McMillan, C. 1989. *Standing Up to the Future: The Maritimes in the 1990's*. Halifax: Council of Maritime Premiers.

Meyer-Krahmer, F. 1985. "Innovation Behaviour and Regional Indigenous Potential". *Regional Studies,* 19: 523-534.

Milne, W. J. and M. Tucker. 1993. "Income Convergence Across Canadian Provinces: Does Growth Theory Help Explain the Process?" *Papers of the Atlantic Canada Economics Association,* 21: 170-182.

Milne, W. J. 1995. "Regional Development Policies: A Time for New Solutions". *Policy Options,* 31-35.

O'Farrell, P. N. 1990. *Small Manufacturing Competitiveness and Performance: An Analysis of Matched Pairs in Nova Scotia and New England*. Halifax: Gardner Pinfold Consulting Economists Ltd.

Porter, M. E. 1990. *The Competitive Advantage of Nations*. New York: The Free Press.

Porter, M. E. and The Monitor Company. 1991. *Canada At The Crossroads: The Reality of a New Competitive Environment*. Ottawa: Business Council on National Issues and Supply and Services Canada.

Savoie, D. J. 1992. *Regional Economic Development: Canada's Search for Solutions*. Toronto: University of Toronto Press.

Endnotes

Editor's Note: Winner of the Canadian Regional Science Association's Student Paper Competition in 1995.

I would like to acknowledge the assistance of William P. Anderson who was instrumental in assisting me with this research from its inception to its eventual completion. I would also like to thank the Editor for comments and advice. Of course, I take responsibility for any errors or omissions that remain.

1. Declining Atlantic fish stocks have made this problem all the more apparent.

2. Although Porter develops his theory at the scale of the nation, as opposed to the region, any conflict between the two is more apparent than real. Porter argues that his theory is readily applicable to political and geographic units smaller than the nation. Regions are often defined in terms of functions and interrelationships that may have more to do with Porter's ideas than an arbitrarily defined nation. This is particularly true of Canada where there are clearly different regional economies.

3. The food processing industry was defined using SIC codes. Excluded from the analysis were firms not selling products intended for eventual human consumption (animal feeds (SIC 2047 and 2048) and manufactured ice (SIC 2097)). In addition, retail bakeries were excluded because they only sold to very local markets (included in SIC 2051). The firm's names and addresses were obtained from Scott Industrial Directories.

4. Self selection bias was a particular concern because of the large proportion of non-respondents. In an attempt to account for this, the responses of those firms replying late in the survey period were compared with earlier responses on the assumption that the former would better reflect non-respondents. The differences between late and early respondents were tested for firm size and the degree of value added production. Only in terms of firm size was a significant difference in the responses suggested.

5. One questionnaire could not be identified as either.

6. Whether this reflects the population as a whole is questionable. Firms experiencing relative success may be more forthcoming with information than those in trouble.

7. Whether the respondents had difficulty finding or keeping employees was cross-tabulated against the two indicators of value added. Although a few results were statistically significant, they were not consistent and there was no clear trend in the data indicating firms with greater value added production had more or less difficulty.

8. However, the existence of large firms like National Sea Products and McCain Foods would appear to run counter to this hypothesis.

TABLE 1 Indicators of Value Added

Value Added	Strategy	Characteristics
Low Value Added	Low Processing	minimum amount of processing to prevent spoilage
	Price Competition	primarily selling point of the product is price
High Value Added	High Processing	process raw foods into products that are seen by consumers as different from the raw input(s)
	Non-Price Competition	

TABLE 2 Annual Firm Sales

$(thousands)	All Firms		Fish Processors		Agrifood-Beverage Processors	
	#	%	#	%	#	%
1 to 99	9	6.67	3	4.69	6	8.57
100 to 499	26	19.26	8	12.50	18	25.71
500 to 999	13	9.63	6	9.38	7	10.00
1,000 to 4,999	32	23.70	21	32.81	11	15.71
5,000 to 9,999	8	5.93	3	4.69	5	7.14
10,000 to 49,999	24	17.78	13	20.31	10	14.29
50,000+	23	17.04	10	15.63	13	18.57
Total No. Firms[a]	135		64		70	

Note:a. signifies that the total number of firms, in this and other tables, is smaller than the survey sample because of missing data or respondent errors.

Source:Survey Data

TABLE 3 Percentage of Production Which Involves a Minimum Amount of Processing

(percent)	All Firms		Fish Processors		Agrifood-beverage Processors	
	#	%	#	%	#	%
0%	37	23.6	6	7.7	30	38.5
1 to 24%	8	5.1	3	3.8	5	6.4
25 to 49%	10	6.4	3	3.8	7	9.0
50 to 74%	8	5.1	4	5.1	4	5.1
75 to 99%	32	20.4	25	32.1	7	9.0
100%	62	39.5	37	47.4	25	32.1
Total No. Firms	157		78		78	

Source:Survey Data

TABLE 4 Production of Products Marketed Primarily in Terms of Price

(percent)	All Firms		Fish Processors		Agrifood-beverage Processors	
	#	%	#	%	#	%
0%	27	17.9	9	12.2	18	23.7
1 to 24%	21	13.9	10	13.5	11	14.5
25 to 49%	24	15.9	10	13.5	14	18.4
50 to 74%	16	10.6	8	10.8	8	10.5
75 to 99%	34	22.5	17	23.0	16	21.1
100%	29	19.2	20	27.0	9	11.8
Total No. Firms	151		74		76	

Source:Survey Data

TABLE 5 Rating of the Importance of Product/Firm Characteristics for Product Sales (on a Scale of 0 to 9), Price/Non-Price Strategies (K-S Test)

	Price Strategy			Non-Price Strategy		
	Average	Median	Standard Deviation	Average	Median	Standard Deviation
Unique Product[a]	3.32	2	3.38	5.45	7	3.57
Packaging	4.24	5	3.24	5.11	6	3.28
Company Reputation	6.63	8	3.25	7.14	8	2.73
Price[a]	6.83	8	2.54	4.59	5	3.08
Brand Name[b]	4.80	5.5	3.58	6.11	8	3.37
Quality[c]	7.60	9	2.67	8.65	9	0.81
Service to Customers[c]	6.06	8	3.54	7.27	9	2.90

Note:significant at a. 0.001, b. 0.01, c. 0.05

Source: Survey Data

TABLE 6 Effect of Greater Non-price Production on the Importance of Distribution Channels (C-D Test)

	All Firms		Fish Processors		Agrifood-beverage Processors	
	y	a	y	a	y	a
Consumers	0.35	<0.001	0.51	<0.001	0.18	0.074
Retail Stores	0.16	0.027	0.45	<0.001	-0.13	0.136
Other Food Processors	-0.29	0.007	-0.20	0.115	-0.36	0.018
Wholesalers/Distributors	0.10	0.100	0.24	0.017	-0.04	0.356
Brokers/Traders	-0.27	<0.001	-0.18	0.056	-0.31	0.045

Note:y is defined in the Appendix and a is the level of significance

Source:Survey Data

TABLE 7 Effect of Greater Non-price Production on the Rating of Factors for Firm Competitiveness (C-D Test)

	All Firms		Fish Processors		Agrifood-beverage Processors	
	y	a	y	a	y	a
Access to a Low Cost Resource	-0.33	<0.001	-0.39	0.01	-0.23	0.03
Availability of Low Cost Labour	-0.10	0.12	-0.15	0.11	-0.02	0.42
Access to Skilled & Highly Skilled Employees	0.08	0.16	0.23	0.03	-0.07	0.27
Access to Affordable Financing	-0.07	0.22	0.22	0.05	0.13	0.14
Access to Specialized Services	0.15	0.04	0.25	0.01	0.04	0.36
Good Quality Resource	-0.14	0.16	-0.02	0.46	-0.19	0.14
Closeness to Main Markets	0.14	0.05	0.15	0.11	-0.03	0.41
Knowledge of Customer Needs	0.21	0.03	0.24	0.04	0.04	0.21
High Quality Products	0.28	0.14	0.27	0.20	0.25	0.27
Ability to Innovate New Products	0.25	<0.001	0.22	0.03	0.17	0.09

Source:Survey Data

TABLE 8 Effect of Greater Non-price Production on the Rating of the Importance of the Following Strategies to Counter Increased Competition (C-D Test)

	All Firms		Fish Processors		Agrifood-beverage Processors	
	y	a	y	a	y	a
Purchase New More Efficient Equipment	0.15	0.050	0.33	0.004	-0.07	0.280
Introduce New Production Process Technology	0.28	<0.001	0.42	<0.001	0.06	0.310
Reduce Overhead Costs	0.13	0.100	0.28	0.030	0.01	0.480
Reduce Size of Your Labour Force	0.01	0.480	0.00	0.490	-0.05	0.360
Look for Assistance from Government(s)	0.15	0.030	0.33	0.003	-0.05	0.350
Introduce Quality Control Measures	0.18	0.020	0.34	0.004	-0.07	0.280
Look for new Markets	0.02	0.420	0.19	0.120	0.12	0.210
Research and Develop New Products	0.22	0.005	0.27	0.010	0.12	0.180
Upgrade the Skills of Employees	0.18	0.010	0.26	0.010	0.07	0.270

Source:Survey Data

TABLE A.1 Cross-Tabulation of the Importance of R&D and the Level of Value Added

		Importance of R&D for Firm Success		
		Low	Moderate	High
Level of Value Added	Low	40	25	12
	Moderate	20	36	25
	High	10	18	38