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SUMMARY

The extent of innovation in small food processing firms in the Border and South West regions of Ireland were examined as were the factors relating to innovation in these firms.

Eighty-five percent of firms undertook some form of innovation in the five years preceding the study. Innovation within firms was related to the youth of the manager and of the firm itself and was also associated with investment in staff training and in Research and Development (R&D) by the firm and with numbers of qualified staff.

External factors which are statistically related to innovation include contacts with equipment suppliers, with customers and with R & D agencies. The link between local environmental factors and innovation appeared to be weak.

The contribution of European Regional Policy to innovation was also examined. Anticipated relationships between regional policy and innovation were not found.

INTRODUCTION

The Department of Agriculture, Food and Rural Development (1998) identified the lack of an innovation culture as being one of the main problems facing the competitiveness of the Irish Food Industry. Previous research in many countries indicates that small and very small food processing enterprises are less innovative when compared with other sectors of the manufacturing industry. Yet in many rural areas they are an important part of the industrial structure and their long-term competitiveness is important for rural development in these areas. Small food firms are generally viewed as low technology enterprises and have received little attention from researchers, hence literature pertaining to innovation in this sector is in short supply.

This research is part of a wider project (INNOVALOC, REF. HPSE-CT-1999-00024) undertaken by a consortium of universities and research institutes funded by the European Union. Seven countries participated, namely Ireland,
Portugal, U.K., France, Belgium, Italy and Poland. A standardised survey intended to measure and explain the innovative performance of small food firms and their relationship to rural development was administered in each country. This report presents the findings from Ireland and aims to identify the most important factors relating to innovation in small food firms. The results are based on the findings of a survey conducted with the top managers of 60 small food processing enterprises in two regions in Ireland, the Border region and the Southwest. The role of regional policy in stimulating innovation was also examined by the Irish team and is reported here.

OBJECTIVES

- To ascertain the factors affecting innovation in small food firms and their relative importance;
- To assess the particular contribution of factors external to the firm but related to the regional environment, to innovation and thereby to rural development.

METHODOLOGY

Qualitative research methods using structured in-depth interviews were employed. The questionnaire used was compiled by Morgan and Crawford (2001). The data in Ireland were collected in the Border and Southwest regions. Senior managers in thirty food processing companies of varying sizes (1-9, 10-19 and 20-49 employees) were selected from each region and interviewed. Quota sampling was used to determine the number of enterprises within each size band to be interviewed. Interviews took from 45 minutes to one hour to complete.

Innovativeness was measured using four indicators, namely an innovation domain index, the extent of product innovation, the impact of innovation on turnover and an overall innovation index (Vaz and Morgan, 2002).
The innovation domain index, using the definition of innovation by Lundvall (1992), measured the number of domains in which innovation took place, i.e. product, process, organisational and new markets. The index was based on a scale from 0 to 4, with a score of 1 being given to firms for each domain in which innovation took place.

The extent of product innovation was measured using three variables: the introduction of new food ingredients, the development of new packaging and changes to the visual appearance of the product. A score of 1 was given for each change made. Firms that made changes in all three areas obtained a score of 3.

The third measure of innovativeness was based on the impact of innovation on a firm’s turnover. Respondents were asked what percentage of turnover was due to new products introduced in the previous five years. This was measured on a scale from 0 to 4, where 0 = less than 1%, 1 = 1 to 5%, 2 = 6 to 10%, 3 = 11 to 20% and 4 = above 20%.

The overall innovation index was based on thirteen variables that were classified under the following headings: (i) product innovation, (ii) process innovation, (iii) organisational innovation and (iv) marketing innovation. Weights, which were determined by a team of experts working on the project, were given to each variable and an index was developed. Using this classification, companies could receive a maximum score of 20.

Each of the above measures was correlated with a number of internal and external factors relevant to the firm to determine the presence of statistically significant relationships and the strength of the associations (Figure 1).
RESULTS

Innovativeness

The results for the four measures of innovation are presented below.

**Innovation domain index:** Eighty-five percent of enterprises had innovated in at least one of the four innovation domains over the five year period preceding the study. Ten percent of the enterprises innovated in one domain, while thirteen percent innovated in two domains. A quarter of the enterprises innovated in three domains, while over a third (37%) innovated in all four (Figure 2).

**Extent of product innovation:** One third of all firms did not engage in any product innovation at all, i.e. they did not introduce any new food ingredients, new packaging materials or make any changes to the visual appearance of their products in the five year period preceding the study. Eight percent of firms made changes in one of these three areas, 17 percent made changes in two areas and 42 percent made changes in all three areas (Figure 3).

**Impact of innovation on turnover:** Thirty-eight percent of firms (23) claimed that new products had contributed to over 21% of their turnover in 2000. However, it should be noted that 12 of these 23 firms were established for 5
years or less. A further 10% claimed that new products were responsible for between 11 and 20% of the turnover in 2000. Three percent claimed new products to be responsible for between 6 and 10% of turnover while 12% stated it to be between 1 and 5% (Figure 4). These results highlight the importance of innovation to small firms.

**Overall innovativeness:** The innovativeness of each enterprise was computed from the overall innovation index (0-20). The mean for the 60 firms was 8.71. The maximum score attained was 19 and the minimum was 1. Figure 5 illustrates the percentage of firms that scored between 0-5, 6-10, 11–15 and 16-20.
Figure 4: Impact of innovation (I) on turnover in small food processing enterprises.

Figure 5: The percentage of small food processing firms and their scores on the innovation index (0-20)

Internal Drivers of Innovation

The size of the firm (all firms in the sample had between 1 and 50 employees) did not have any impact on innovation. Ownership type was also insignificant to the process of innovation. However, the number of years established had a significant but negative correlation with each of the four measures of innovation. Other studies have revealed similar results. Exporting was positively correlated to the innovation domain index and the overall innovation index.

Several characteristics of the manager, including age, the number of years in the enterprise and the number of years in top management position were all inversely-related to the four measurements of innovation. It could be argued that younger managers bring new ideas to the firm and therefore inspire a
greater number of innovations than older managers. The possession of a post-school qualification was significantly correlated to each of the innovation indicators, with the exception of impact on turnover.

Technological licences and patents were not correlated to any measure of innovation. A significant correlation, however, was found between the purchasing of food processing equipment, a typical innovation input, and percentage of turnover due to new products. Over half (58%) of all enterprises interviewed undertook some form of R&D. On average, enterprises spent 2.3 percent of turnover on R&D activities in 2000. The presence of R&D activities and the percentage of turnover spent on R&D were positively related to innovation.

Staff training and the percentage of turnover spent on staff training were also significantly correlated to each of the innovation indicators. An average of 1% of turnover was spent on staff training.

The innovation capability of the firm was measured using the percentage of qualified technical staff to total workforce. Despite the average percentage of qualified technical staff to total workforce being as low as 5.4%, the variable proved to be significantly related to the innovation domain index and the overall innovation index.

External Drivers of Innovation

There was a significant and positive correlation between innovation and a number of the external sources of new product and process ideas and R&D inputs. Contact with equipment suppliers was significantly related to all innovation indicators, with the exception of percentage of turnover. Contact with customers was significantly related to each of the four indicators, while contact with similar enterprises was related to the innovation domain index and overall innovation index. Contract R&D/research institutes/universities was related to the novelty of the innovation, the innovation domain index and overall innovation index.

Of all the potential sources of innovation located within the region, similar enterprises was the only one which was significantly correlated to each of the
four innovation indicators. Interaction with customers was positively related to the extent of the innovation.

Eighty-eight percent of enterprises received assistance from the government or a government-supported agency. Sixty-seven percent received assistance at regional level, 43% at national level and 22% at EU level. National assistance was positively related to the innovation domain index. No other significant relationships were found between government support and innovation.

Regional Comparison

The two regions were selected owing to differences in their economic performance (Gross Value Added [GVA] per capita, rate of unemployment) and their general food culture. For the purpose of this study, the Border region includes counties Donegal, Sligo, Leitrim and Cavan, while the Southwest includes Cork and Kerry.

Economic conditions, including GVA per person, employment structure and unemployment rate, vary greatly between the regions. In 1999, the GVA was significantly higher in the Southwest region, standing at 11.2% above the state average, while that in the Border region was 25% below (CSO, 1999). Unemployment is higher in the Border region, standing at 5.8% compared with 3.8% in the Southwest (CSO, 2001). Educational qualifications varied between the regions with 25% of persons aged 15 years old and over in the Border region reporting to have ceased their education under the age of 15 compared with 19% in the Southwest.

Further differences were noted in the structure of the food industry. Firstly, there were almost twice as many food enterprises in the Southwest (148) as in the Border region (77). Twenty-three percent of all industrial workers in the Southwest were employed in the food sector as compared to 18% in the Border region. The support system in place for food companies located in the Southwest is much stronger than that of the Border region. The Southwest contains a well-established food research centre and a university with well developed food science and food business departments. In addition to this, in 1996 a regional brand (Fuchsia) was established in west Cork by the West
Cork Leader Co-Op Society. This initiative was developed to promote the food and tourism products of the region.

Firms in the Border region, on the contrary, do not have research facilities available to them to the same extent as those in the Southwest. However, although not as developed as that in West Cork, a cross-border food programme was developed in 1999 between food companies in Lisburn, Co. Antrim and those in Co. Leitrim and a distinctive brand was developed.

For all of these reasons it would be expected that the firms in the Southwest would be more innovative than those in the Border region.

As before, innovation was measured using four dimensions: product innovation, process innovation, organisational innovation and marketing innovation. Seventeen per cent of enterprises in the border region did not engage in any innovative activities at all, compared with thirteen per cent in the Southwest. However, all remaining enterprises undertook innovation in at least one domain. Figure 4 illustrates the percentage of enterprises that engaged in each type of innovation in the respective regions.

The overall innovativeness of each enterprise was computed based on the innovation index. However, despite the economic differences, the mean attained by each region for overall innovation was similar, with the Southwest attaining a score of 10.5 and the Border region attaining 10.1.

Figure 6: Innovation domains undertaken by small food processing firms in each region.
There was a difference between the mean ages of the firms, with those in the Border region (11 years) being significantly younger than those in the Southwest (18 years) (p<.05). Furthermore, 30% of the enterprises in the Border region sample were 5 years or younger, compared with 10% in the Southwest. To ascertain the impact of age on overall innovative score, firms 5 years or younger were temporarily omitted and the new innovative mean obtained. The Southwest scored 9.8 while the Border scored 7.7. Although the difference between the means was greater than that obtained from all firms, it was still not statistically significant.

Despite the economy in the Southwest region being more conducive to innovation, there was no significant difference in the overall mean innovativeness in the firms located in the regions under study. Factors such as percentage of exports, the presence of a post-school qualification, the ratio of technical staff to overall staff and interaction with external sources are all positively related to innovation. Firms in the Southwest region scored more favourably than those in the Border region in each of these factors, with the exception of interaction with customers. Other factors, including age of the manager, number of years in the enterprise, number of years acting as top manager, percentage of turnover spent on R&D and staff training, attained similar results in each region.

**Regional Policy**

As part of the EU collaboration, the Irish partners were in charge of an analysis of the role of regional policy in innovation. The results are summarised here.

Regional policy was considered first from theoretical perspectives. Its operation in each of the regions in the study was described and the characteristics of regional policy as practiced were synthesised. A number of hypotheses from the literature were then defined. These hypotheses were tested, in so far as feasible, from the secondary data collected. Finally, regional policy in member states and especially in the applicant countries was put in the context of European regional policy.
In this review, regional policy means policies the aim of which is to narrow the gap in incomes between less-developed and more-developed regions within a country. While physical infrastructure was always recognised as an important contributor to economic growth, in more recent decades much of the emphasis in regional policy has been on the provision of innovation and knowledge creation facilities, and on adding to the stock of human capital. Other policies have important regional implications and the analysis of regional policy should not be confined to policies that are explicitly regional.

The analysis of regional policies was related to general aspects of regional development, the degree to which policy is devolved, whether there are significant policy differences between regions and the perceived overall impact of the policy on development. Only in Belgium, France and Italy do we see regional policy devolved and distinct policy differences between regions. In the other four countries, policy development and administration is centralised. Expert opinion in each of these latter countries seems to indicate that regional policy is not a major factor in economic development.

The priorities within regional policies were identified. Ireland and France (Languedoc-Roussillon) represent alternative approaches. In Ireland, regional policy has predominantly been about direct encouragement of industry, location of industry and provision of infrastructure. The approach in Languedoc-Roussillon is indirect with emphasis on increasing the skills base through manpower policy and on investment in research and development. In the context of the overall study, French regional policy would appear to more directly foster innovation than policy in other states.

The literature suggests an hypothesis, that levels of innovation will be higher in the Italian and French regions than in the other regions in the study, based on a greater degree of devolution of regional policy and greater emphasis on manpower and R&D policies.

The evidence to support such a hypothesis is lacking. At an aggregate level, the French and Italian regions do not rate highly in their level of innovation. At the micro level, the story is similar. Italian firms had a below average capacity to innovate in each category observed. French results were close to those expected. Results showed greater levels of innovation among UK firms,
while regional policy in the UK is seen as centralised and not so concerned with manpower policy or research and development.

There is a clear regional policy objective of the European Union, a regional policy directorate within the Commission and a regional development fund. In addition, the EU has a policy for ‘economic and social cohesion’ which largely overlaps with the concept of regional policy. The term ‘cohesion policy’ is now being used almost interchangeably with ‘regional policy’.

For the period 2000-2006, transfers to less prosperous regions and social groups will account for one third of the EU budget. The extent of regional disparities within the Union is reviewed regularly. The cohesion countries continued to converge towards the EU15 income level.

Increases in regional disparities within countries were observed between 1995 and 2000. The spread of regional incomes per head increased by five percentage points or more in Finland, Sweden and Ireland. Nevertheless, because there was convergence in the average income levels of Member States, overall disparities between EU regions as a whole were practically unchanged between 1995 and 2000.

Regional income disparities in the EU are set to increase markedly upon enlargement; the ratio of income per head in the top and bottom 10% of regions in 2000 was 2.6 in the EU15, while for EU25 it was 4.4. In 2000, 48 regions, accounting for 18% of EU15 population, had incomes below 75% of the EU15 average. In an enlarged Union of 25, a total of 67 regions, representing 26% of total population, will fall below the 75% threshold.

Almost all the regions of the candidate countries in 2000 were in the group of 25% of the poorest ‘EU-25’ regions. Very significant differences exist also between the different candidate countries. The average level of GDP per capita in the richest of the candidate country regions, i.e. the region of Prague, is 7 times higher than in the poorest region of Romania. Also within each of these countries the level of GDP per capita is very differentiated. In the Czech Republic, the disparity of the level of GDP per capita between the most wealthy and the poorest region is 2.6 times and in Hungary 2.4 times.

In accordance with the Copenhagen summit, the ten new member countries
over the years 2004-2006 are guaranteed €21.7 million. In order to use these funds, the candidate countries are preparing regional development programmes that are consistent with the regional policy of the EU. They must also guarantee in their own budgets the co-financing of the European Union programmes. The shaping of new regional policy in CEE countries is oriented at the enhancement of the competitiveness of the regions. This is an effect of the opening of such economies to global markets and of the launch of the process of integration with the European Union.

CONCLUSION

The extent of innovation in small food firms was highlighted. Eighty-five percent of these firms had made some innovation in their enterprises over a five year period. Similar figures were achieved in the other European regions examined. This contrasts with the widespread perception that there is little innovation in small or traditional firms.

Much previous work on the factors, both within the firm and outside it, which are correlated with (and may contribute to) innovation was confirmed. Among the more interesting findings were the correlations between innovation and younger firms and younger managers. The predicted relationship between innovation and investment in R&D, investment in training and the percentage of technically-qualified staff was confirmed.

In relation to the impact of external factors, expected relationships were confirmed between innovation and equipment suppliers, customers and external research agencies. The weakness of the regional component was surprising. Also surprising was the absence of a statistically-significant difference in innovation activity between the two Irish regions.

The analysis of regional policy impacts also seemed to raise questions about conventional wisdom. Differences in the degree of innovativeness between the regions in the survey, whether measured at a macro level or from the results of this study, did not accord with hypotheses regarding the contribution of regional policy to innovation.
RECOMMENDATIONS TO INDUSTRY

Innovation is crucial both to the survival and growth of small businesses and to their competitive positions. However, for these firms to remain competitive, innovation must be at the heart of their operations. Recommendations are as follows:

- Training of managers should be ongoing to ensure a consistent level of motivation throughout their career with the firm.

- R&D activities and R&D expenditure are highly-correlated to innovation in small food firms and therefore should be viewed as a vital ingredient in NPD process.

- There is a clear positive relationship between innovativeness and the presence of customer linkages. The ‘voice of the customer’ should be at the centre of any plan to develop new products.

- With regard to the impact of external linkages upon innovation, similar enterprises and contract R&D/research institutes/universities positively contributed to the innovativeness of firms on a national level. On a regional basis, the only significant link was with similar enterprises. This highlights the need for stronger regional networks to be put in place.

- There was a positive relationship between overall assistance received from government or government support agencies and innovation. However, further analysis revealed that the strength of this relationship lay in national assistance received from the government as opposed to that received on a regional basis. This finding accentuates the need for greater regional linkages within both regions under study.
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