BUSINESS SMEASURE™

Evaluation of the R&D tax credit Baseline Study 2

R&D perspectives from New Zealand small enterprises

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R&D PERSPECTIVES FROM NEW ZEALAND SMALL ENTERPRISES

Evaluation of the R&D tax credit
Baseline Study Two

Prepared for
Ministry of Research, Science and Technology

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Executive Summary

In April 2008 the New Zealand government introduced an R&D tax credit scheme to encourage firms to invest more in R&D and increase their productivity and competitiveness. The Ministry of Research, Science and Technology (MoRST) is charged with evaluating the effectiveness of the design and implementation of the R&D tax credit and the impact of the tax credit on the level of R&D undertaken. MoRST has commissioned a series of baseline studies to assess the pre-implementation level of business R&D. This report forms one of those baseline studies and will be used to judge the effectiveness of government policy in this area.

The specific objective of this study was to better understand participant behaviour of small and medium enterprises (SMEs) as they make decisions about preparing to take up the R&D tax credit. The evaluation focused on five main areas (developed by MoRST) namely: the definition of R&D used by firms when reporting R&D; the documentation of R&D activities; any reporting systems of R&D expenditure; expectations of R&D development within the next financial year, and; difficulties in accurately distinguishing and reporting R&D activities externally.

In the course of this research, the R&D tax credit has been repealed from the 2009-10 income year, remaining in place for the 2008-09 year.

The study formed part of Busines**SME**asure, a yearly longitudinal study of SMEs in New Zealand.

The number of firms that completed the survey was 1539. Sixty-two percent of these firms were micro (0 – 5 FTEs[1]), 36 percent were small (6 – 49 FTEs) and two percent were medium (50 – 99 FTEs). Two thirds of the firms operated in the services sector while the remainder were from the manufacturing and primary sectors.

INNOVATION IN SMALL FIRMS

- The innovation rate for the firms surveyed was 42 percent (n=645).
- The survey identified four types of innovation, product, process, organisational and marketing innovations. Each type of innovation accounted for 20 to 25 percent of the total innovation activity, indicating that not all of the different types of innovation occurred, with no particular type being dominant.
- Within the SME sector the innovation rate clearly increases with firm size. While 54 percent of small firms could be described as innovators, only 34 percent of micro-firms were innovators.
- Both manufacturers and service providers showed similar levels of overall innovation.
- Half of firm innovations for each type of innovation were developed internally by the firm itself.
- Significantly more manufacturers (60 percent) than service providers (33 percent) developed their own product innovations.
- Forty percent of firms reported that less than 10 percent of sales resulted from their innovation activity, and another 40 percent reported more than 10 percent of sales,

[1] FTE full time equivalent staff

while 12 percent of firms could not estimate the percentage of sales that resulted from their innovation activity.

- While 43 percent of innovating firms reported increased productivity, only 21 percent of non-innovating firms did. Thirty-five percent of innovating firms reported an increase in market share compared to 15 percent of non-innovating firms.
- The most common reasons for engaging in innovation activities were to increase revenue, to increase responsiveness to customers, to improve productivity and to establish or exploit new market opportunities.
- The three most important factors that hampered innovation activities were the lack of access to capital, lack of qualified staff and high innovation costs.
- When it came to innovating, micro-firms were significantly more constrained by lack of access to capital whereas small firms were significantly more constrained by a lack of qualified staff.
- The most important sources of innovative information for firms were customers (94 percent), other businesses (92 percent) and employees (92 percent). Books, journals and the internet were regarded as equally important (91 percent).

R&D IN SMALL FIRMS

- The proportion of surveyed SMEs that undertook or invested in R&D in the last 12 months was 16 percent, while 38 percent of innovating firms undertook or invested in R&D in the last 12 months.
- Significantly more small firms (43 percent) were engaged in R&D than micro-firms (33 percent).
- Manufacturing firms were significantly more likely to engage in R&D than service providers.
- R&D active firms were significantly more likely to report increased turnover, increased profitability and increased market share in the last 12 months. They were also significantly more likely to be exporters.
- The benefits gained from R&D in the last twelve months most commonly reported were increased responsiveness to customers (83 percent), improved productivity (77 percent), increased revenue (77 percent) and established or exploited new market opportunities (74 percent).
- Overall, 57 percent of respondents indicated that they go with their "gut feeling" when it comes to deciding whether an activity is R&D or not.
- For the majority of firms (57 percent) R&D was something the firm initiated periodically when there was a recognised need.
- Twenty-two percent of R&D active firms indicated that they have received government funding for undertaking R&D activities.
- No statistical evidence could be found that receiving funding was somehow linked to the firm's understanding or commitment of R&D.
- Overall results showed that only half the firms kept some form of project plan.
- Systematic documentation of R&D activity was more likely to occur in firms where R&D was an integral part of their firm's activity.
- Firms that received funding had a more systematic approach to documenting their R&D activity than those that had never received funding.

- Overall, the figures showed that R&D expenditure by SMEs in the study is low. More than half of the firms reported R&D expenditure of less than NZ$10,000 in the last 12 months.
- There was a clear link between the firm's commitment to R&D and how systematically they recorded their R&D expenses
- The majority of firms indicated that they expected the amount of R&D activity to remain the same for the next financial year.

CONCLUSIONS

Overall, results suggest that the understanding of R&D by SMEs is unlikely to comply with the R&D tax credit definition, as their definition tends to be informal and may not cover all of the elements of the R&D tax credit definition.

However this study found that a quarter of R&D active firms have done personal study or attended a workshop to learn about R&D. This small group of firms is most likely to have an understanding of R&D that aligns with Inland Revenue's requirements.

Results showed that there is considerable scope to develop SMEs' understanding of R&D. Ideally, the understanding of R&D has to be simultaneously developed with the firm's commitment to R&D as a core part of their activity. This learning and development process has to be guided by the so-called "trusted advisers".

To qualify for the R&D tax credit, firms need to keep sufficient documentation to provide evidence of their R&D activity. Overall results showed that the most common practice among R&D active SMEs in the study was to keep a basic project plan with *ad hoc* notes (40 percent of firms). Specific and simple guidelines or templates on how to document R&D might assist SMEs to comply with the requirements. Most importantly those templates need to take into account the informal processes within SMEs and should focus on the minimum requirements needed.

Firms also have to meet the minimum threshold of NZ$20,000 of eligible expenditure carried out in house, or must outsource work to a listed research provider in order to get the R&D tax credit. The R&D expenditure reported by the firms surveyed was comparably low. Only about one third of firms spent more than NZ$20,000 on R&D in the last 12 months. These firms were twice as likely to be "larger" in size, i.e. employing 6 to 49 employees. However, figures on self-reported R&D expenditure in small firms are problematic, because small firms tend to underestimate their R&D expenses. Given the low R&D expenditure (as indicated by the firms), the compliance costs might be perceived as too high to actually generate a financial benefit from the R&D tax credit.

Another requirement to apply for the R&D tax credit involves the need for firms to record their expenditure. Although the records required to claim the R&D tax credit are similar to those required for other tax purposes, R&D expenditure needs to be identified separately.

Results showed that almost half of the firms (45 percent) indicated that they kept no records at all for R&D expenses.

While firm size mattered when it came to the amount of R&D expenditure, it didn't matter when it came to recording practices. However, the firm's commitment to undertake R&D as an integral and core part of their firm's activity was again an important factor.

Only nineteen percent of firms expected to increase their R&D activity in the next 12 months, sixty-five percent expected it to stay about the same and sixteen percent expected it to decrease. There was a clear link between the firm's commitment to R&D and what they expected to happen to their R&D in the next financial year.

BusinesSMEasure is a project that has been designed with one goal in mind: delivering excellent research to all those who can use it - the managers of New Zealand's 450,000 firms, those working in banks and other organisations that make up the 'support infrastructure' and all those involved with developing government policies and programmes. The aim of BusinesSMEasure is to examine small and medium sized firms as they develop through an ongoing, longitudinal research program.

In the first phase researchers visited and interviewed 400 firms in eight separate studies. This produced a hugely valuable resource and formed the foundation for the second phase of BusinesSMEasure, a quantitative survey. The specific objective of this survey is to gather data over time that relates both to the characteristics of the firm and its performance, and to the owner-managers. The survey is administered annually by mail and online. Each survey has potential to gather data on an issue of current concern – using the approach typical of an 'omnibus survey', thus allowing the researchers to gather data on highly topical subjects. Using this approach makes it possible for interested parties to insert their own set of questions and to have data collected and analysed.

DEFINING SMEs

Consistent with international definitions, but allowing for the fact that large firms in New Zealand are smaller than large firms in other countries, we define SMEs in the following way:

Micro-enterprise: 5 staff and fewer

Small enterprise: between 6 and 49 staff

Medium enterprises: between 50 and 99 staff

Sixty-nine percent of enterprises in New Zealand have no employees and 89 percent employ five or fewer people. Micro-enterprises are an important group that are not captured by nationwide business surveys, like the Business Operations Survey (BOS). BusinesSMEasure has been designed to produce regular, reliable and independent evidence on New Zealand SMEs and to complement existing surveys by including firms with fewer than five FTEs.

Research focus

Policies designed to promote and facilitate innovation and research and development (R&D) in New Zealand firms are of particular interest - and there has been substantial expansion of this kind of effort in recent years. Innovation in particular is seen as an important pathway to improving profits and growing the economy - by encouraging firms to create new high value-added products, processes and services. However, despite the importance of R&D for economic development, most firms tend to under-invest in R&D, perhaps because they do not understand how best to capitalise on the benefits from that investment. This is likely to be particularly true for SMEs.

In April 2008 the New Zealand government introduced an R&D tax credit scheme to encourage firms to invest more in R&D and increase their productivity and competitiveness. This is a significant policy shift and one that needs close monitoring to asses its impact – particularly on SMEs.

The Ministry of Research, Science and Technology (MoRST) is leading the evaluation of the effectiveness of the design and implementation of the R&D tax credit and the impact of the tax credit on the level of R&D undertaken. The evaluation framework developed by MoRST is holistic and comprehensive in the way that it is designed around an intervention logic model, which allows for different levels of evaluation. It is designed alongside rather than after the introduction of the tax credit, making New Zealand one of the first countries with an evaluation that includes early and pre-implementation studies. As a result, MoRST has commissioned a series of baseline studies to assess the pre-implementation level of business R&D.

As defined by MoRST the purpose of the baseline studies is to inform a synthesis of crucial baseline information about business R&D activity and its reporting by business during the tax credit implementation period.

The specific objective of this study is to better understand participant behaviour of SMEs as they make decisions about preparing to take up the R&D tax credit.

MoRST has contracted the New Zealand Centre for SME Research to develop and include a set of evaluative questions in the Busines**SME**asure survey, collect and analyse data and report on the findings.

MoRST has developed five key evaluation questions to be answered by this study:

- How well developed is the definition of R&D used by firms when reporting R&D?
- How well do firms document their R&D activities?
- What systems do firms currently have for reporting R&D expenditure?
- What do firms expect to happen to the amount of R&D they undertake in the next financial year?
- What is the biggest difficulty for firms in accurately distinguishing and reporting its R&D activities externally?

The R&D tax credit scheme

A 15% tax credit was introduced for research and development (R&D) activities carried out by New Zealand businesses, from the 2008-2009 income year. The R&D tax credit is delivered and administered through the tax system, forming part of the firm's income tax assessment.

The R&D tax credit operates on a self-assessment basis. This means firms are responsible for meeting the key eligibility criteria for the tax credit. The main criteria are outlined below:

- The tax credit is available to firms operating in New Zealand and the R&D activities carried out are related to the firms current or intended business
- To be classified as an eligible firm, firms need to control the R&D, bear the financial risk and own the results.
- To be eligible for the tax credit, the firms' R&D activities must include systematic, investigative and experimental (SIE) activities carried out to acquire new knowledge or create new or improved materials, products, devices, processes or services. Further, these activities are either intended to achieve an advance in science or technology by resolving scientific or technological uncertainty, or to have an appreciable element of novelty. Certain activities are excluded.
- Eligible expenditure must exceed $20,000, unless the firm has commissioned research from a listed research provider (LRP), or the firm has only been eligible for part of the year in which case the $20,000 minimum threshold is pro-rated.
- Firms can claim the tax credit as part of their annual income tax return, reducing the firms' liability to income tax.

For more detailed information please see the special report from the Policy Advice Division of Inland Revenue[2].

During the period of this research, the R&D tax credit has been repealed from the 2009-10 income year, remaining in place for the 2008-09 year. Please see the special report from the Policy Advice Division of Inland Revenue[3] for more information.

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[2] http://www.taxpolicy.ird.govt.nz/publications/files/RandDSR.pdf

[3] http://www.taxpolicy.ird.govt.nz/publications/files/RandDSpecialReport.pdf

Methodological Background

The New Zealand Centre for SME Research has developed a sound methodological approach that has been evaluated by peer review and that follows the guidelines provided by Massey University's Human Ethics Committee. Busines**SME**asure is designed as a longitudinal study. Given the relatively high attrition rate in the SME sector we have opted to use a revolving panel. This means that we feed in new firms at each wave to keep the size of our panel stable.

SAMPLING FRAME AND SAMPLING SIZE

The population of New Zealand SMEs comprises 458,354[4] private sector enterprises, equalling 99 percent of all enterprises in New Zealand. The following Table provided the sampling frame for Busines**SME**asure and shows the New Zealand SME population by size.

Size group	No. of enterprises	% of enterprises
0	314,733	69
1-5	97,846	21
6-49	43,597	10
50-99	2,178	1
Total	**458,354**	**100**

Table 1: Private sector enterprises in New Zealand by size (MED, 2008)[5]

The 2008 Busines**SME**asure sample is a random sample of 4340 firms. The sample consisted of 1,336 firms who responded in 2007 (longitudinal subsample) plus 3,004 new firms added to the sample in 2008 (newcomer subsample). The sample was purchased from APN Infomedia, a national business database supplier. The number of ineligible and unreachable firms[6] in this sample was one percent (n = 447), leaving 3893 firms eligible, reachable firms.

RESPONSE RATE

There were 1539 respondents to the survey which gives is a response rate of 40 percent. The response rate for businesses in the longitudinal subsample was higher (48 percent). The response rate leaves potential for non-response bias in the results, and so the survey results can not be defended as statistically representative of the SME population as a whole.

The maximum margin of error at the 95 percent confidence interval for the sample of 1539 respondents is ± 3 percent. This figure increases with decreasing size of a subsample. For

[4] Based on the 2007 Longitudinal Business Frame which covers all industries, including agriculture. For more information see www.statistics.govt.nz.

[5] Ministry of Economic Development. (2008). SMEs in New Zealand. Structure and Dynamics. Wellington, New Zealand: Ministry of Economic Development.

[6] These are firms that we couldn't contact, for example, because of wrong contact details or because the firm had closed.

the subsample "innovators" (n = 645) the maximum margin of error is ± 4 %, and for the subsample "R&D active firms" (n = 252) the maximum margin of error is ± 6%. These error figures assume a statistically random sample and do not include errors that may be associated with non-response bias that may have occurred given the 40 percent response rate.

Data quality was considered satisfactory for the relevant variables. No missing data techniques were applied.

STATISTICAL METHODS

Two statistical tests were used to analyse data – chi-square test and Student's t-test.

The chi-square test is a nonparametric statistical test that is used to examine differences with categorical variables. For the purpose of this report, a two-tailed test chi-square test was applied.

Student's t-Test assesses whether the means of two groups are *statistically* different from each other by comparing sample means and displaying the two-tailed probability of the difference between the means.

If a result is referred to as "statistically significant", there is statistical evidence that there is a difference. For the purpose of this report a 5% level of significance was applied. This means that the finding has a 95% chance of being true.

DATA COLLECTION

Busines**SME**asure is a postal survey. The survey was posted out between 20 October and 22 December 2008 using a four stage approach at an interval of two weeks. The first mailout contained an information letter and the survey questionnaire. Step two in the mailout process entailed a postcard reminder. This was followed up by another reminder letter and survey questionnaire and the final step was another postcard reminder. The survey form was addressed to the owner, owner-manager or managing director. Data were collected using a 49 item questionnaire comprising four sections:

- Section A: Social and environmental responsibility
- Section B: Innovation
- Section C: Firm performance
- Section D: Demographics

Respondents' Profile[7]

ABOUT THE OWNERS

The survey revealed demographic results about the individual owners and owner-managers who make up the respondents of the 2008 Busines**SME**asure survey. The information we collected includes: owner age, type of firm entry, age at firm entry, gender and ethnicity of owner.

Owner age

The range of age of the owners who responded to the survey was between 24 and 90, with an average age of 54 years. The majority (68 percent) of owners were between 41 and 60 years old. The biggest group (37 percent) was the 51 to 60 year olds, whereas only 8 percent of the sample was under 40 years old. Table 2 shows a more detailed analysis of the age distribution.

Age	No. of respondents	% of respondents
30 and younger	7	<1
31 to 40	111	7
41 to 50	455	30
51 to 60	550	37
61 to 70	323	15
71 and older	48	3
Total	1493	100

Table 2: Number of owners by age

Firm entry

As the results in Table 3 show, the most common way to enter a firm was to start it up. More than half of the respondents (58 percent) had started up their firm, followed by 34 percent who bought it as a going concern. A small group (5 percent) entered the firm by way of a management buy-out and 4 percent had inherited the firm in question.

Firm entrance	No. of respondents	% of respondents
Started it up	856	58
Bought going concern	495	34
Management buy-out	68	5
Inherited	56	4
Total	1475	100

Table 3: Number of owners by the way they entered the firm

[7] The number of respondents varies by question as not all respondents answered all demographic questions.

Firm entry age

On average, the owners were 38 when they entered or started up the firm. A quarter of respondents indicated that they were 30 years and younger at firm entry, while 36 percent entered the firm between the ages of 31 and 40, and 27 percent were between 41 and 50 years old.

Age at firm entry	No. of respondents	% of respondents
30 and younger	384	26
31 to 40	520	36
41 to 50	396	27
51 and older	165	11
Total	1465	100

Table 4: Number of owners at firm entry by age of owner

Gender

As Table 5 shows, 74 percent of the owners were male and 26 percent were female.

Gender	No. of respondents	% of respondents
Male	1111	74
Female	398	26
Total	1509	100

Table 5: Number of owners by gender

Ethnicity

As shown in Table 6, 88 percent of the respondents were of New Zealand European descent.

Ethnicity	No. of respondents	% of respondents
New Zealand European	1332	88
Maori	21	1
Chinese	18	1
Indian	15	1
Other	121	8
Total	1507	100

Table 6: Number of owners by ethnicity

Table 7 shows the break down of respondents by age at firm entry and ethnicity.

	% of respondents by ethnicity	
Age at firm entry	NZ European	Other
30 and younger	24	2
31 to 40	31	5
41 to 50	23	4
51 and older	10	1
Total	88	12

Table 7: Number of owners by ethnicity and age at firm entry

ABOUT THE FIRM

The survey also collected data about firm size, types of employees, age and type of firm, industry, location, whether the firm exported or not, and the size of the turnover.

Size

Based on the number of full time equivalent (FTE) employees, 18 percent of firms did not have any employees. Forty-four percent of the firms employed one to five FTEs, 36 percent employed six to 49 FTEs and two percent employed 50 to 99 FTEs. The average number of FTEs per firm was seven.

Firm size (FTEs)	No. of firms	BusinesSMEasure % of firms	Longitudinal Business Frame[8] % of firms
0 employees	282	18	69
1 to 5	670	44	21
6 to 49	559	36	10
50 to 99	28	2	1
Total	1539	100	100

Table 8: Number of firms by size (FTEs)

The average number of full-time employees was eight while the average number of part-time employees was three. Eleven percent of all firms had unpaid family workers in their firm (an average of one unpaid family worker). Of the unpaid family workers the majority of firms used one unpaid family worker (70 percent), 25 percent used two unpaid family workers with the maximum number of unpaid family workers being five.

BusinesSMEasure is a longitudinal research programme with the aim of gathering data over time that relates both to the characteristics of the firm and its performance, and to the owner-managers. Table 8 shows that the sample is not representative of the New Zealand business

[8] Based on the 2007 Longitudinal Business Frame which covers all industries, including agriculture. For more information see www.statistics.govt.nz.

population. Because of the nature of the research programme no weighting techniques were applied.

Turnover

The average turnover for the firms in our sample over the last 12 months was $2.2 million. Table 9 shows that while the majority of respondents (53 percent) had a turnover of more than $500k, 47 percent had a turnover of $500k or less, with 32 percent falling in the $100k to $500k band.

Turnover	No. of firms	% of firms
$100k or less	185	15
$100k - $500k	389	32
$500k - $1m	242	20
$1m - $5m	323	26
$5m and more	89	7
Total	1228	100

Table 9: Number of firms by turnover

Table 10 shows the distribution of turnover by firm size. Fifteen percent of firms employed 1 to 5 FTEs had a turnover of over $500k, while 30 percent of firms employed 6 to 49 FTEs and had a turnover of over $500k.

	% of firms by size group			
Turnover	0	1 to 5	6 to 49	50 to 99
$100k or less	10	5	1	0
$100k - $500k	6	23	3	0
$500k - $1m	0	11	9	0
$1m - $5m	0	4	21	0
$5m and more	0	0	6	2

Table 10: Number of firms by turnover and firm size (FTEs)

Age of firm

The average age of the firms in our sample was 23 years. Seventy-seven percent were over 10 years old, while only five percent had been operating for less than five years. Table 11 shows the age distribution of the firms in more detail:

Firm age (years)	No. of firms	% of firms
5 or younger	62	5
6 – 10	241	19
11 – 20	453	35
21 and older	546	42
Total	1302	100

Table 11: Number of firms by firm age

Type of firm

Three quarters (74 percent) of the respondents indicated that their firms were set up as a limited liability company. Thirteen percent reported that their firm was a partnership, while 14 percent were sole traders. Over half of the respondents (54 percent) described their firms as a family business.

Form of legal ownership	No. of firms	% of firms
Limited Liability	1097	74
Partnership	186	13
Sole trader	208	14
Total	1491	100

Table 12: Number of firms by type of ownership

Exports

The percentage of firms exporting in the previous 12 months was 12. Of these firms 60 percent reported that exporting accounted for less than 10 percent of their annual turnover, fourteen percent that it accounted for 11 to 25 percent of their annual turnover and 10 percent that it accounted for 26 to 50 percent of their annual turnover. Table 13 gives more detail about the percentage of turnover generated by exports:

Export status	No. of firms	% of firms
Not exporting	1348	88
Exporting	189	12
Percentage of turnover of exporters	No. of firms	% of firms
1% to 10%	111	60
11% to 25%	26	14
26% to 50%	19	10
51% to 75%	12	7
More than 75%	17	9
Total	185	100

Table 13: Percentage of turnover generated by exports in the last 12 months

Industry sector

For information about the industry sector, the survey used the Australian and New Zealand Standard Industrial Classification – New Zealand Version 1996 (ANZSIC96). Two thirds of the firms were services firms (67 percent, n=887) while the remainder (33 percent, n=502) were manufacturing firms.[9] The three industry sectors with the highest participation rate were manufacturing (17 percent), retail trade (16 percent) and construction (11 percent). Table 14 shows the distribution of the sample by industry sectors:

	Industry sector (ANZSIC)	No. of firms	% of firms
A	Agriculture, forestry and fishing	87	6
B	Mining	2	0
C	Manufacturing	235	17
D	Electricity, gas and water supply	23	2
E	Construction	155	11
F	Wholesale trade	125	9
G	Retail trade	227	16
H	Accommodation, cafes and restaurants	91	7
I	Transport and storage	53	4
J	Communication services	36	3
K	Finance and insurance	68	5
L	Property and business services	43	3
N	Education	46	3
O	Health and community services	44	3
P	Cultural and recreational services	101	7
Q	Personal and other services	53	4
	Total	1389	100

Table 14: Number of firms by industry sector (ANZSIC)

[9] For this study, wider manufacturing firms consists of ANZSIC codes A to E and services firms consists of F to P. Government Administration and Defence (M) is excluded.

Regional location

This survey used a nation-wide sample, covering 16 regions. The regions with the most respondents were Auckland (22 percent), Canterbury (15 percent) and Wellington (10 percent).Table 15 shows the distribution of the sample by regions.

Region	No. of firms	% of firms
Northland	89	6
Auckland	331	22
Waikato	130	9
Bay of Plenty	112	8
Gisborne	22	2
Hawkes Bay	78	5
Taranaki	51	4
Manawatu-Wanganui	84	6
Wellington	150	10
West Coast	26	2
Canterbury	214	15
Otago	59	4
Southland	28	2
Tasman	25	2
Nelson	48	3
Marlborough	30	2
Total	1477	100

Table 15: Number of firms by region

The findings are split into two chapters. The first chapter is on innovation in small firms providing some contextual information for the second chapter on research and development (R&D) in small firms.[10]

INNOVATION RATE

This study followed the OECD's definition of innovation as set out in the third edition of the Oslo Manual (2005, p.46) which states that:

"An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practice, workplace organisation or external relations."

In the survey four types of innovation were distinguished:

1. Product innovations which refer to new or significantly improved goods or services
2. Process innovations which refer to new or significantly improved methods for production or delivery
3. Organisational innovations which refer to new or significantly improved methods in a firm's business practice, workplace organisation or external relations
4. Marketing innovations which refer to new or significantly improved marketing methods.

The innovation rate describes the number of firms that undertook any activity during the last 12 months that resulted in *at least* one of the four types of innovation divided by the total number of respondent firms. The innovation rate for the firms surveyed is 42 percent (n=645). This group is subsequently referred to as "*innovators*". Regarding the four types of innovation, each type accounted for between 20 to 25 percent of the total innovation activity. This means that all of the different types of innovation occurred, with no type being dominant.

Innovation rate by firm size

Within the SME sector innovation rate clearly increases with firm size. While 54 percent of small firms could be described as innovators, only 34 percent of micro-firms were innovators. As Table 16 outlines small firms had higher innovation rates across all four types of innovation, but no "typical" innovation type for micro-firms or small firms could be identified. Independent of size, firms showed innovation activity across all four types of innovation, with no one type being more prevalent than others.

	Micro (%)	Small (%)	Total (%)
Product innovation	18	30	22
Process innovation	15	29	20
Organisational innovation	16	31	22
Marketing innovation	20	32	24
Overall innovation rate	**34**	**54**	**42**

Table 16: Innovation activity by firm size

[10] Firms employing more than 49 staff are excluded from the analysis from this point on (n=28)

Innovation rate by sector

No difference could be found in the overall innovation rate by sector. Both, manufacturers and service providers, showed similar levels of overall innovation. When examining the different types of innovation in detail, it became evident that manufacturers showed slightly more product and process innovation than services providers. However, no significant difference was found for organisational and marketing innovation.

	Manufacturers	Service providers	Total
	%	%	%
Product innovation	26	21	23
Process innovation	24	20	21
Organisational innovation	22	23	22
Marketing innovation	24	25	25
Overall innovation rate	**44**	**41**	**42**

Table 17: Innovation activity by sector

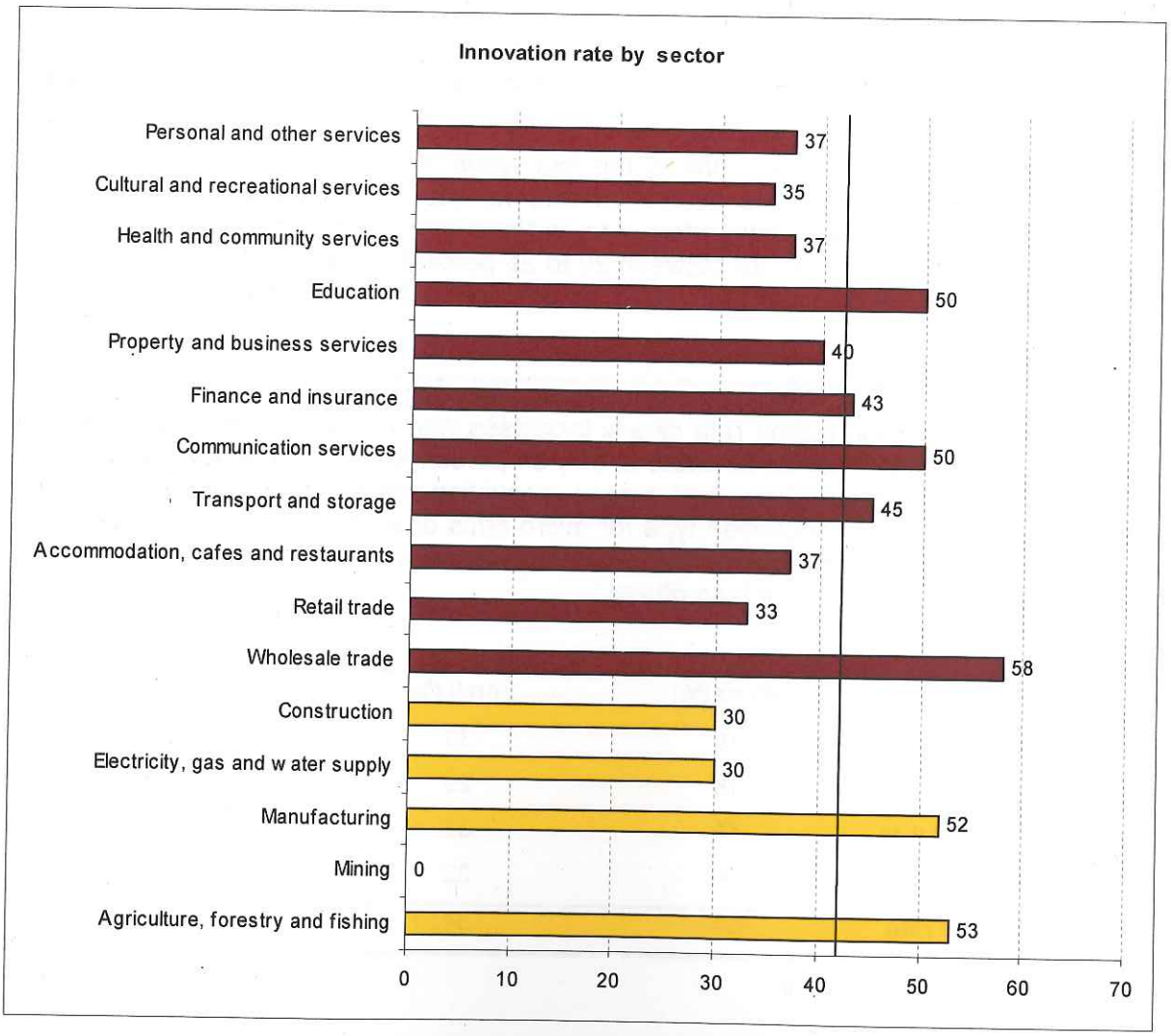

Figure 1: Innovation rate by sector

Figure 1 provides an overview of the rate of innovation across industry sector. Wholesale trade showed the highest innovation rate with 58 percent, followed by agriculture, forestry and fishing (53 percent) and manufacturing (52 percent). Both communication services and education reported a 50 percent innovation rate, while transport and storage, and finance and insurance were slightly above the overall innovation rate with a rate of 45 percent and 43 percent, respectively. All other sectors had rates lower than the firm innovation rate of 42 percent.

INNOVATION DEVELOPMENT

In order to determine whether innovations were developed solely by the firm, in partnership with other firms or obtained from other firms the survey asked innovating firms how each type of innovation was developed.

	By firm %	In partnership %	Obtained from others with improvements %	Obtained form others without improvements %
Product innovation	42	23	15	20
Process innovation	54	25	15	6
Organisational innovation	46	27	24	14
Marketing innovation	43	37	10	11
Overall	56	36	20	18

Table 18: Innovation development

Results indicate that about half of firm innovations for each type of innovation were developed internally by the firm itself. While 21 percent to 38 percent of firms obtained their innovations from others, most likely for product innovation and organisational innovation, process and marketing innovation was more likely to be developed by the firms themselves.

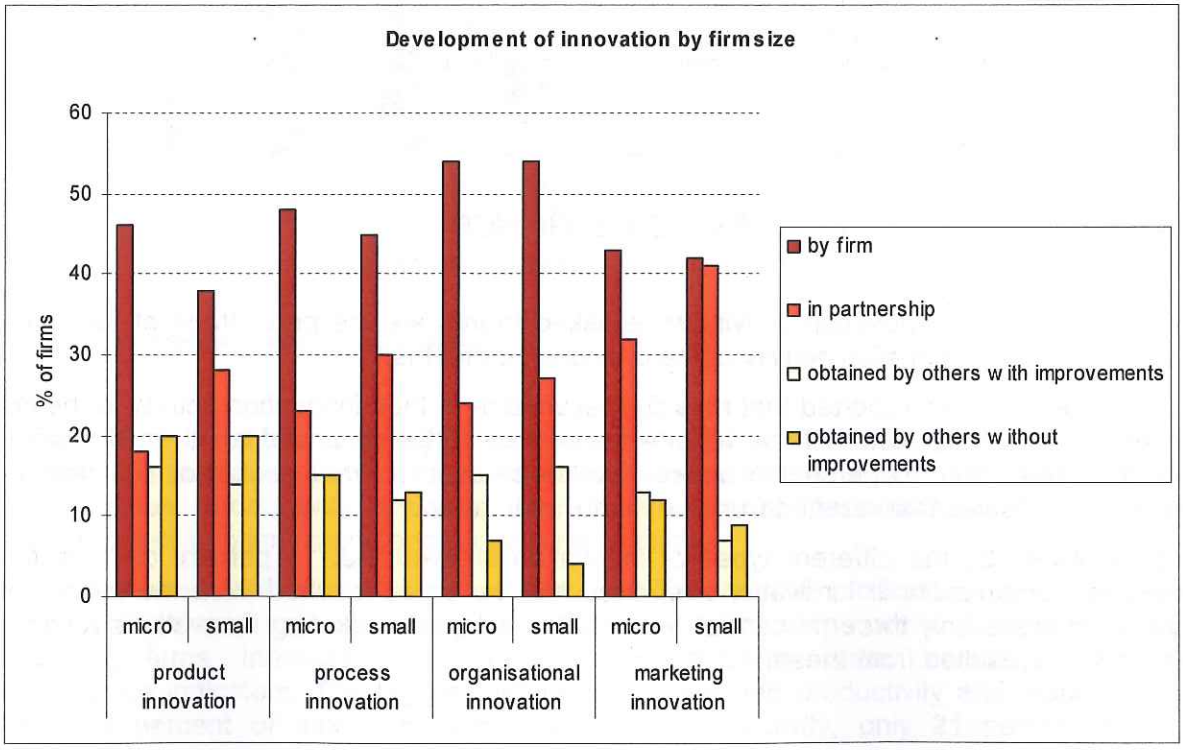

Figure 2: Innovation rate by firm size

Results by firm size show that 46 percent of micro-firms developed their own product innovations as opposed to 38 percent of small firms. In contrast only 18 percent of micro-firms developed product innovations in partnership with others as opposed to 28 percent of small firms. However, this difference was not statistically significant; suggesting that firm size had no influence in the way firms developed their innovations. A detailed analysis of the development of innovation by firm size is presented in Figure 2.

Results by sector show that significantly more manufacturers (60 percent) than service providers (33 percent) developed their own product innovations. Product innovation rate in the service sector was generally low. No differences between the two sectors could be found for process innovation, organisational innovation and marketing innovation.

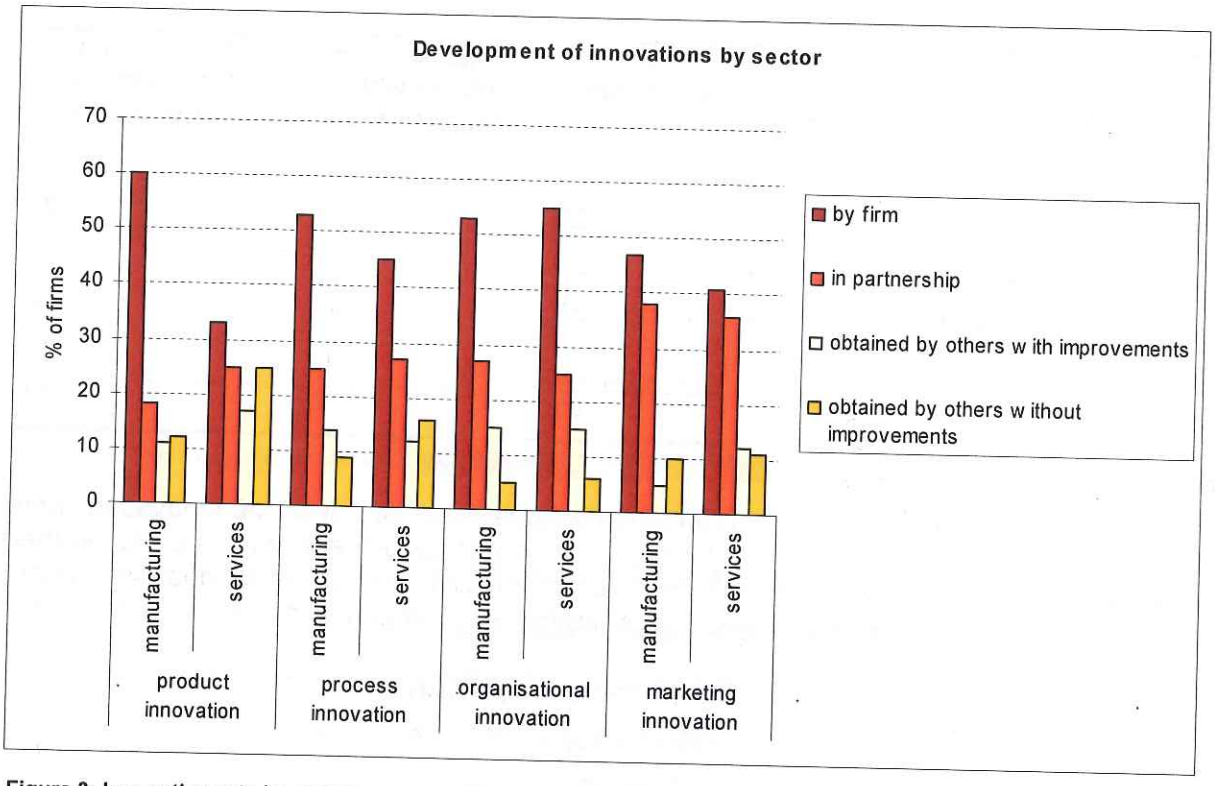

Figure 3: Innovation rate by sector

INNOVATION AND BUSINESS PERFORMANCE

Firms who showed innovation activity were asked to indicate the percentage of sales that resulted from the innovation activity of the previous 12 months.

Eight percent of firms reported that no sales resulted from their innovation activity in the last 12 months. Forty percent of firms reported less than 10 percent, and another 40 percent reported more than 10 percent of sales. Twelve percent of firms could not estimate the percentage of sales that resulted from their innovation activity.

Data analysed by the different types of innovation showed that 11 percent of firms that developed organisational innovations reported that no sales resulted from the innovation activity, whereas only three percent of firms that developed marketing innovations reported that no sales resulted from these.

Table 19 shows percentage of sales by firm size. No evidence could be found that small firms could capitalise more on their innovations than micro-firms.

	Zero	Less than 10%	11%-25%	26% to 50%	51% to 75%	More than 75%
Micro-firms	10	44	33	9	3	1
Small firms	8	47	38	6	1	0
Total	8	40	31	7	2	1

Table 19: Percentage of sales by firm size

Figure 4 suggests that firms that developed product innovations tended to generate more sales from their innovation activity than firms developing other types of innovation. However, no statistical significance could be found.

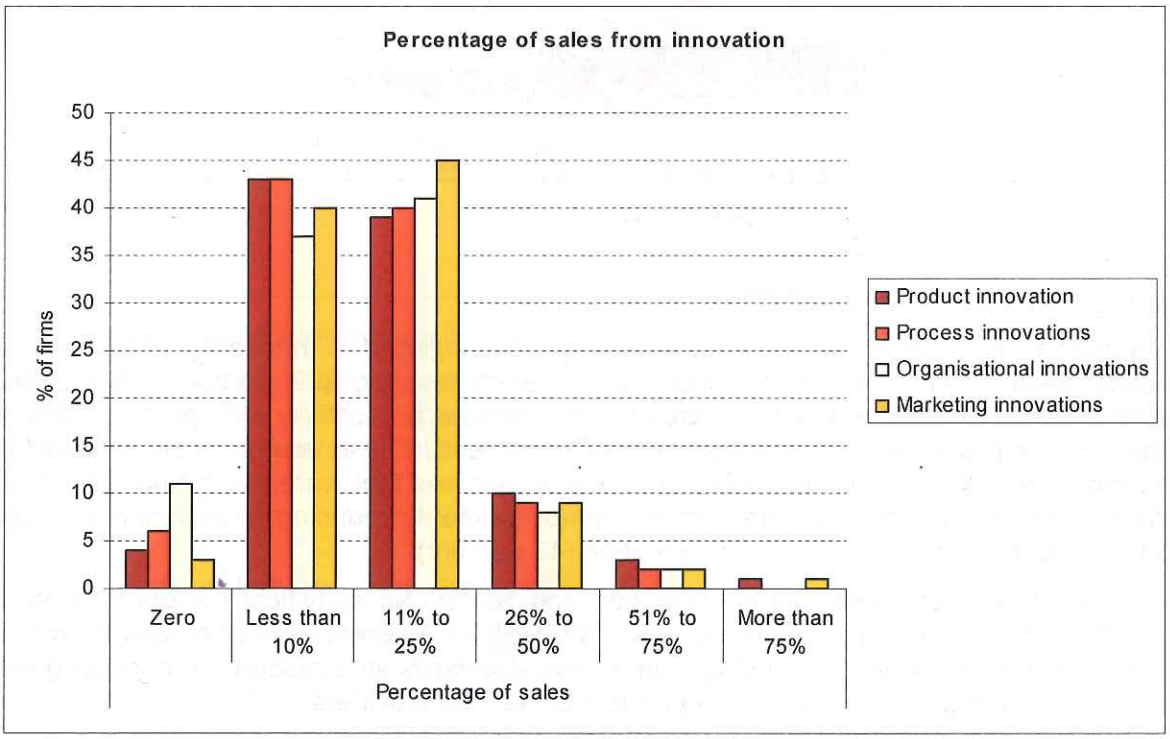

Figure 4: Percentage of sales from innovation

All firms were asked to compare their current performance to that of the previous 12 months. Performance measures that were used included turnover, profitability, market share, number of employees, productivity and exports. These business performance indicators were compared between innovating and non-innovating firms.

Results showed that increase in turnover, profitability and productivity were the most commonly achieved measures for both innovators and non-innovators. Compared to non-innovating firms, innovating firms performed significantly better across all business performance indicators. The biggest differences concerned productivity and market share. While 43 percent of innovating firms increased productivity, only 21 percent of non-

innovating firms did. Thirty-five percent of innovating firms reported an increase in market share compared to 15 percent of non-innovating firms.

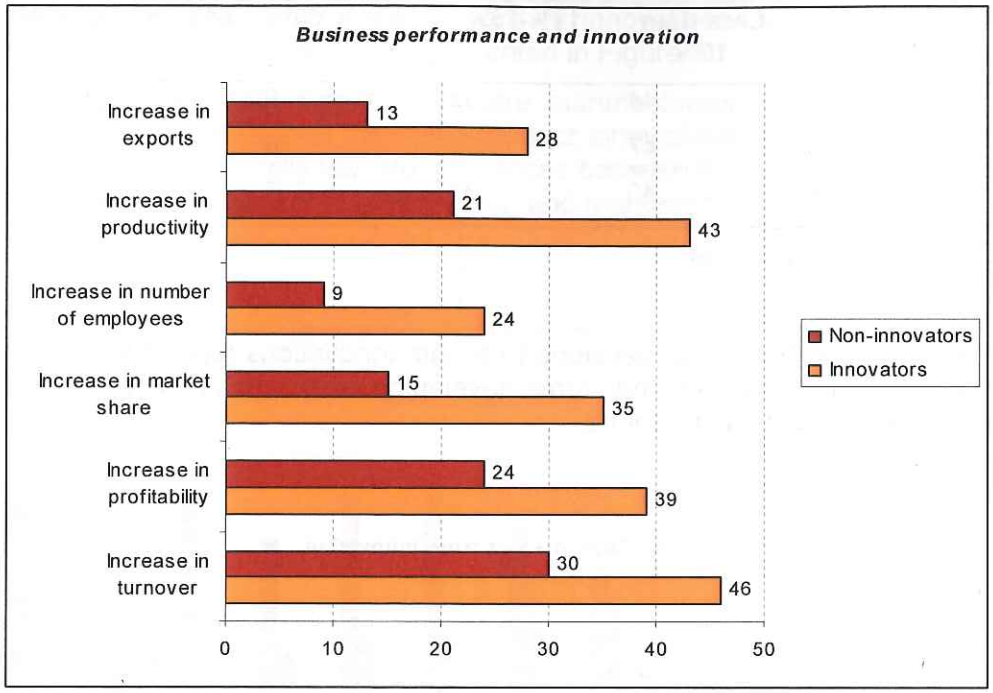

Figure 5: Business performance and innovation

REASONS FOR INNOVATION

All innovating firms were asked to indicate why they engaged in innovation activities. The reasons most commonly reported were to increase revenue (99 percent), to increase responsiveness to customers (97 percent), to improve productivity (96 percent) and to establish or exploit new market opportunities (95 percent). These reasons were followed by reducing costs (86 percent), replacing products or services that were being phased out (60 percent), improving work and safety standards (55 percent), reducing environmental impact (45 percent) and reducing energy consumption (43 percent).

Results were almost similar across firm size and sector. No statistical evidence could be found that the reasons for innovating were different for different firm sizes or for firms in different sectors. However, improving work safety standards as a reason for innovating was more commonly cited by manufacturing firms than service providers.

BARRIERS TO INNOVATION

Innovating firms were asked to choose the most important factor that hampered their innovation activities from a list of ten different factors. Figure 6 illustrates the results which showed that the three most important factors were the lack of access to capital (25 percent), lack of qualified staff (20 percent) and high innovation costs (15 percent). All other factors accounted for 10 percent or less. These were: competition activity in the same market (10 percent), no need due to prior innovations (8 percent), lack of market demand for innovation (7 percent), government regulation or policy (7 percent), lack of ability to use new technology (4 percent), difficulty in finding cooperation partners for innovation (3 percent) and difficulty to protect intellectual property (3 percent).

Figure 6 examines the differences between small and micro-firms when it came to factors hampering their innovation activities. When it came to innovating, micro-firms were

significantly more constrained by lack of access to capital (16 percent as opposed to 7 percent of small firms) whereas small firms were significantly more constrained by a lack of qualified staff (13 percent as opposed to 7 percent micro-firms).

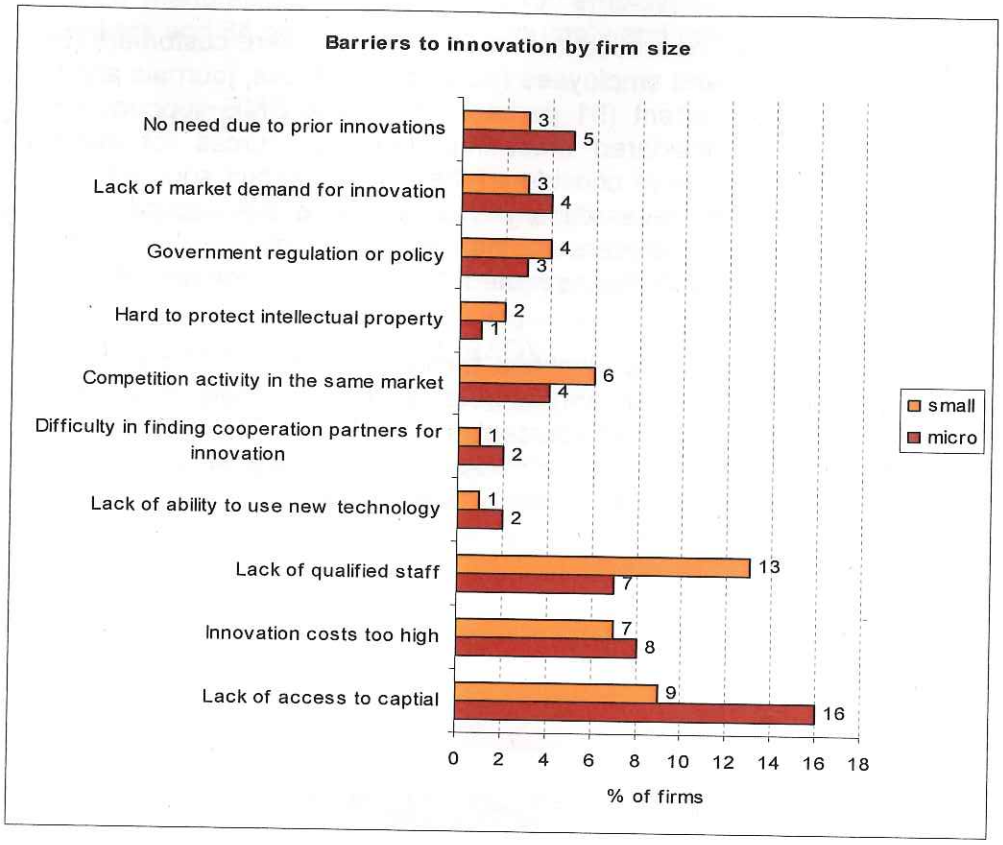

Figure 6: Barriers to innovation by firm size

With regard to sector, findings were generally similar across all factors and no statistically significant differences could be found. However, service providers showed higher ratings across all factors (as illustrated below in Figure 7).

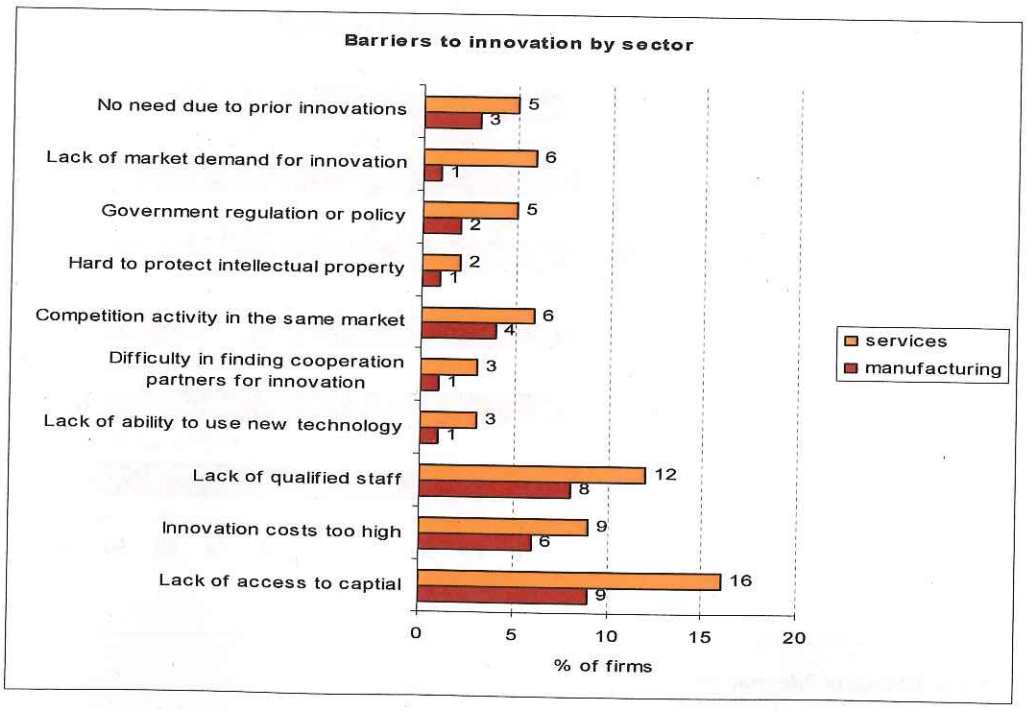

Figure 7: Barriers to innovation by sector

SOURCES OF INFORMATION

Innovating firms were asked to identify the sources of ideas or information for their innovation activities.

The most important sources of innovative information for firms were customers (94 percent), other businesses (92 percent) and employees (92 percent). Books, journals and the internet were regarded as equally important (91 percent). From the SME support infrastructure, industry associations were considered most important as sources for information (87 percent). Government agencies were considered the least important source for the purpose of innovation. With 42 percent, research organisations were the second least important source. Interestingly accountants, lawyers and bankers who generally play an important role as a source of information for SMEs, seemed to be less important when it came to innovation.

With regard to firm size, micro-firms identified family and friends (74 percent) as well as books, journal and the internet (94 percent) as being significantly more important as sources for information than small firms did (60 percent for family and friends and 86 percent for books, journals and internet). However, employees were a significantly more important source of information for small firms (94 percent) than for micro-firms (89 percent).

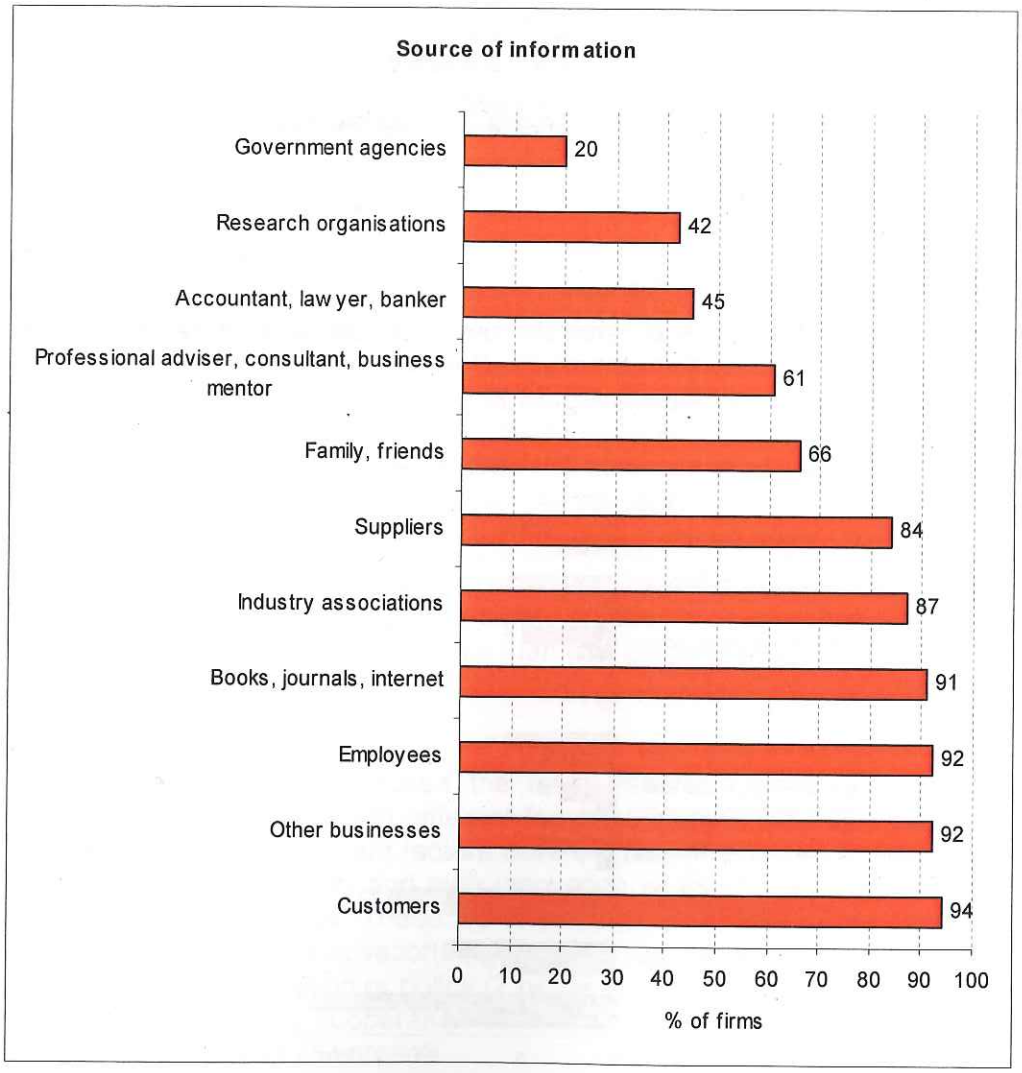

Figure 8: Source of information

For sector, results were similar across almost all sources of information. However, service providers identified employees (94 percent), accountants, lawyers or bankers (49 percent) as well as books, journals and internet (93 percent) as significantly more important sources of information than manufacturers (87 percent for employees, 36 percent for accountants, lawyers or bankers and 84 percent for books, journals and internet).

INNOVATION ACTIVITIES

The survey asked all innovating firms to indicate which activities had supported their innovation during the last 12 months. The activities covered a range of innovation activities: Acquisition of machinery, equipment and software; acquisition of external knowledge; training of employees; marketing of new or significantly improved products and undertaking or investing in research and development (R&D).

Figure 9 shows that 72 percent of firms acquired machinery, equipment or software to support their innovations, 65 percent of firms trained their employees and half of the firms marketed their new or significantly improved product. Thirty-eight percent of all innovating firms undertook or invested in R&D in the last 12 months to support their innovations. Acquisition of external knowledge such as the purchase or licensing of patents and non-patented inventions was the innovation activity least engaged in (27 percent).

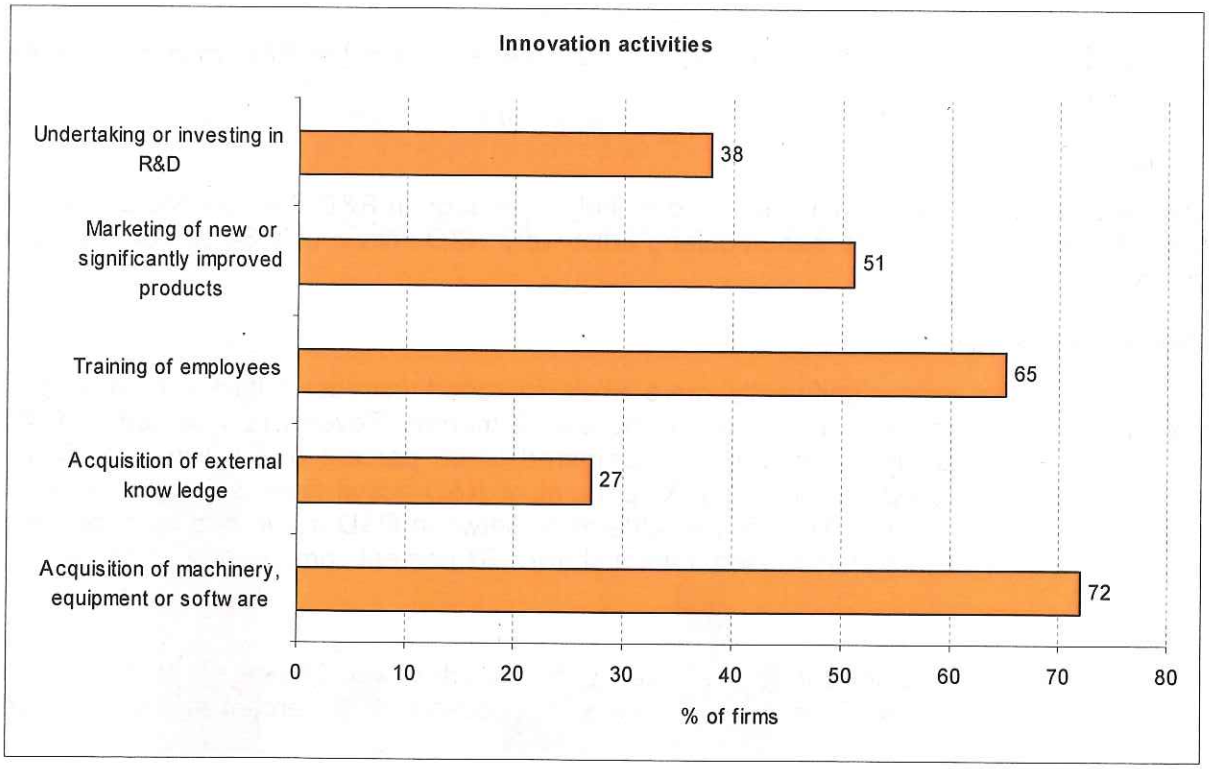

Figure 9: Innovation activities

R&D in small firms

This chapter provides information on R&D in New Zealand small firms. The chapter is divided into six sections, starting with an exploration of the characteristics of firms that are undertaking or investing in R&D, followed by a section on how R&D adds value to small firms. The following sections are guided by the four evaluative questions identified by MoRST: definition of R&D, documentation of R&D activity, recording R&D expenditure and credit claim data.

CHARACTERISTICS OF R&D ACTIVE FIRMS

This chapter reports on data collected from firms that undertook or invested in R&D in the previous 12 months. Firms were provided with a definition of R&D and then asked to self select whether the firm was R&D active.

As mentioned above, 38 percent (n=252) of innovating firms undertook or invested in R&D in the last 12 months. Overall the number of SMEs that undertook or invested in R&D in the last 12 months accounted for 16 percent (n=252) of all SMEs surveyed. Data were explored to identify some characteristics of the firms that were undertaking or investing in R&D, from here on referred to as *R&D active* firms:

Firm size:

Significantly more small firms (43 percent, n=129) were engaged in R&D than micro-firms (33 percent, n=108).

Sector:

Manufacturing firms were significantly more likely to engage in R&D than service providers. While 47 percent (n=105) of manufacturing firms were R&D active, only 34 percent (n=147) of service providers were.

Firm performance:

R&D active firms were significantly more likely to report increased turnover, increased profitability and increased market share in the last 12 months. Seventy-four percent of R&D active firms reported increased turnover compared to 60 percent of R&D inactive firms. Increased profitability was reported by 63 percent of R&D active firms as opposed to 53 percent R&D inactive firms. The biggest difference between R&D active and inactive firms was identified with regard to increased market share – 87 percent compared to 71 percent.

Exports:

R&D active firms were significantly more likely to be exporters with 31 percent of R&D active firms engaged in exports in the last 12 months as opposed to 13 percent of R&D inactive firms.

Family business:

No difference could be found between R&D active and inactive firms with regard to them being a family business or not.

Firm age:

No evidence could be found that the age of the firm was somehow related to the firm's engagement or investment in R&D. The average age of both R&D active, and inactive firms

was 22 years, pointing to rather mature and established firms. This could be a reflection of the sample where only 5 percent of firms are younger than 5 years.

BENEFITS OF UNDERTAKING R&D

This section explores how undertaking R&D adds value to the firms surveyed.

All R&D active firms were asked to indicate what benefits they had gained through undertaking R&D in the last 12 months. The benefits most commonly reported were increased responsiveness to customers (83 percent), improved productivity (77 percent), increased revenue (77 percent) and established or exploited new market opportunities (74 percent). These reasons were followed by reduced costs (52 percent), replaced products or services being phased out (49 percent), reduced environmental impact (31 percent), improved work and safety standards (28 percent) and reduced energy consumption (15 percent).

This ranking is almost identical with the ranking of reasons for the firm engaging in innovation activities provided in the chapter on innovation (p. 23).

DEFINITION OF R&D

Guided by the first evaluative question "How well developed is the definition of R&D used by firms when reporting R&D?" firm owner-managers were asked how they knew whether they engaged in R&D or not and how R&D was carried out in their firm.

Overall, 57 percent of R&D active firms indicated that they go with their "gut feeling" when it comes to deciding whether an activity is R&D or not. Twenty three percent said that they had done some personal study or attended a workshop to learn about R&D and 11 percent trust their R&D person, technician or contract provider. Only 9 percent trusted their accountant or equivalent person to advice them. As discussed in the previous chapter, this is an interesting finding, as accountants are generally regarded as "trusted advisers" within the SME sector.

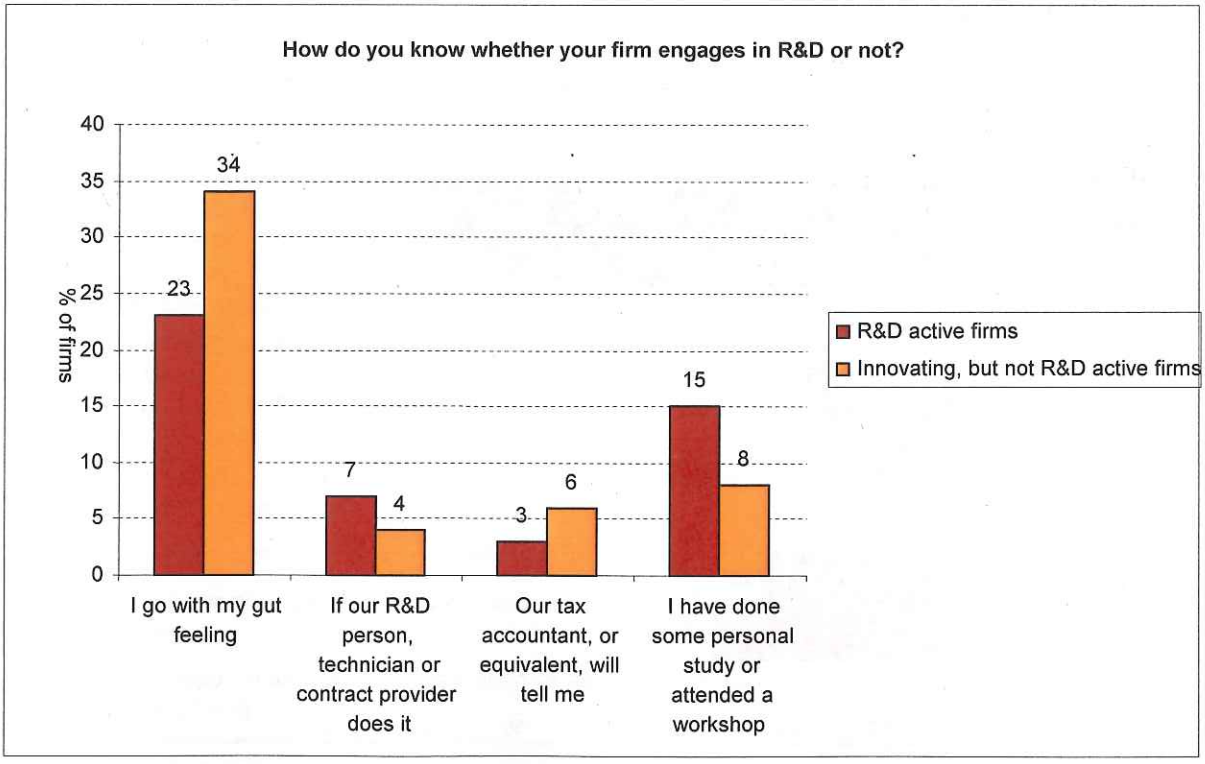

Figure 10: Definition of R&D by R&D active and inactive firms

Figure 10 above shows the difference in the understanding of R&D by R&D active firms and by innovating, but not R&D active firms. Firms that were R&D active were significantly more

likely to have done some personal study or to have attended a workshop to learn about R&D, than innovating, but R&D inactive firms. In contrast, these latter firms were significantly more likely to go with their "gut feeling". The tax accountant, or equivalent person, was a source of advice and information for only 3 percent of the R&D active firms.

With regard to firm size, small firms were significantly more likely to trust their R&D person, technician or contract provider (15 percent as opposed to 6 percent). This is not surprisingly, because the smaller the firm the less likely it is to employ an R&D person. However, results showed that micro-firms tended to be more likely to have done some personal study, to have attended a workshop (25 percent as opposed to 21 percent) or to trust their accountant (12 percent as opposed to 6 percent). Overall, the majority of firms (58 percent for each group), and regardless of size, went with their "gut feeling" when it came to deciding whether an activity qualifies as R&D or not.

With regards to sector (manufacturing and service) it seems that to go with the "gut feeling" is more common in the service sector than for manufacturers (60 percent as opposed to 52 percent). No difference could be found between the two sectors (24 percent manufacturers and 22 percent service providers) when it came to undertaking personal study to learn about R&D.

Besides the firm owner-managers' understanding of R&D they were also asked about their commitment to R&D. For the majority of firms (57 percent) R&D was something the firm initiated periodically when there was a recognised need. A quarter of firms (26 percent) indicated that R&D was an integral and core part of the firm's activity, followed by 17 percent that reported that R&D was an integral but peripheral part of the firm's activity.

While firm size was clearly related to the firm owner-managers' understanding of R&D, no link could be found between firm size and commitment to R&D. Small firms were not more likely to undertake R&D as an integral part of their firm's activity than micro-firms. On the other hand, micro-firms were less likely to periodically initiate R&D than small firms. Figure 12 shows the details.

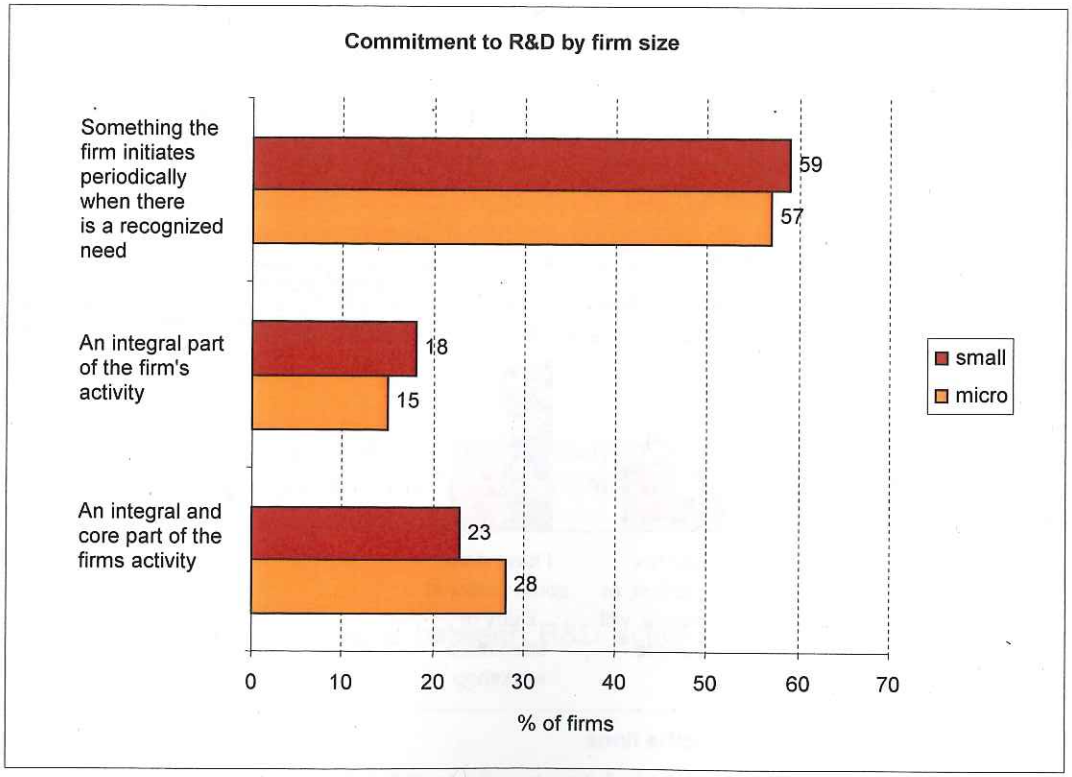

Figure 11: Commitment to R&D by firm size

The R&D active firms were asked whether they received funding from the Foundation for Research Science and Technology (the Foundation), New Zealand Trade & Enterprise (NZTE) or another organisation. Twenty-two percent of R&D active firms indicated that they have received funding for undertaking R&D activities. More than half of the firms had received funding from NZTE (54 percent), one third from other organisations (32 percent) and 14 percent from the Foundation.

Interestingly, no statistical evidence could be found that receiving funding was somehow linked to the firm's understanding or commitment of R&D.

However, there was a clear link between the firm's understanding of R&D and its commitment to undertake R&D. Table 20 shows that in firms where R&D was an integral part of their firm's activity rather than something that is initiated periodically, respondents had done more personal study or attended a workshop rather than following their "gut feeling".

	Integral and core part %	Integral, but peripheral part %	Periodically initiated %
I go with my gut feeling	29	42	58
If our R&D person, technician or contract provider does it	21	20	12
Our tax accountant or equivalent will tell me	2	2	9
I have done some personal study or attended a workshop	49	36	21

Table 20: Understanding of R&D and commitment to undertake R&D

DOCUMENTATION OF R&D ACTIVITY

This section addresses the second evaluative question, namely "How well do firms document their R&D activities?"

Overall results showed that while roughly half the firms kept some form of project plan, the other half did not. It was most likely that firms kept either a basic project plan with *ad hoc* notes (40 percent) or kept no project plan, but some form of written documentation (34 percent). However, it was unlikely that firms kept a complete project plan and documentation for each project stage (14 percent). At the same time it was also unlikely that they kept no written documentation at all (12 percent). All in all, 88 percent of firms kept some sort of written documentation ranging from systematic documentation to loose notes.

	Percentage
I keep a complete project plan and documentation for each project stage	14
I keep a basic project plan with *ad hoc* notes	40
I have no project plan, but I keep some notes here and there	34
I keep no written documentation at all – it is all sitting in my head	12

Table 21: Documentation of R&D activity

Again, no statistical evidence could be found that the size of the firm was linked to the way in which the documentation of R&D activity is done. Firms employing five employees or fewer did not seem to be less systematic in their documentation of R&D activity than firms employing between 6 and 49 staff.

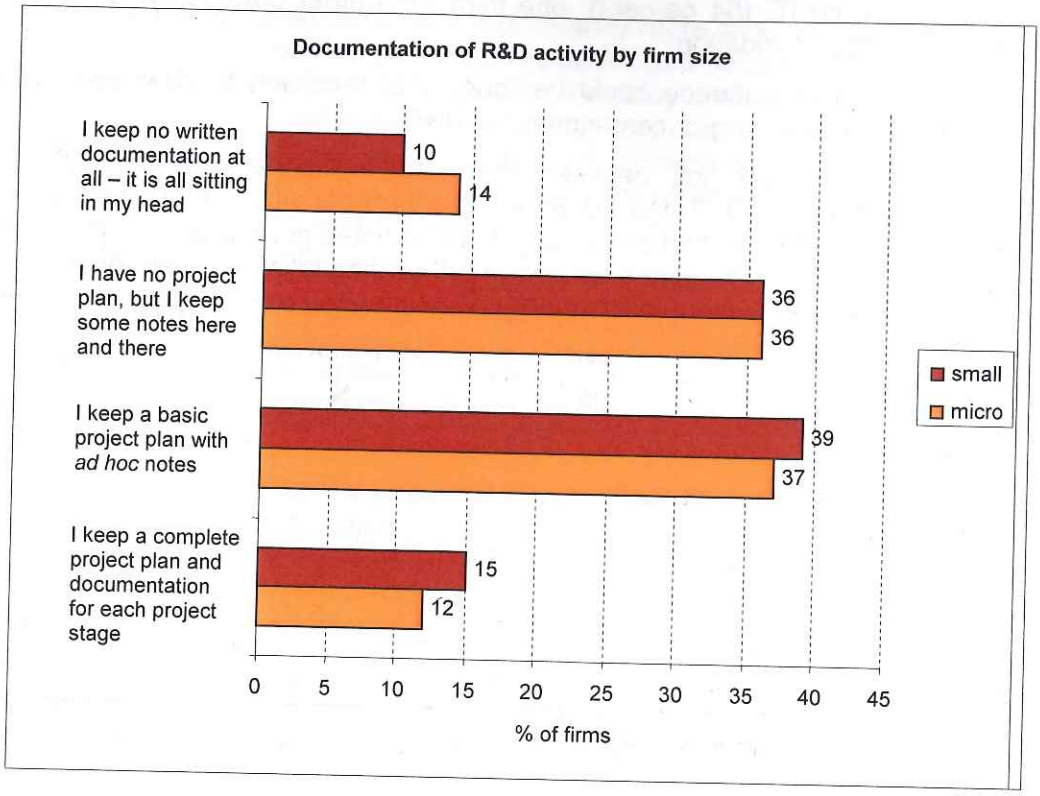

Figure 12: Documentation of R&D activity by firm size

Again there was a clear link between the firm's commitment to R&D and how systematic the firm documents R&D activity. Table 22 shows that in firms where R&D is an integral part of their firm's activity rather than something that is initiated periodically, it was significantly more likely that systematic documentation of R&D activity was kept. In firms where R&D was initiated periodically on the basis of an identified need, it was significantly more likely that written documentation was *ad hoc* only or did not exist at all.

	Integral and core part	Integral, but peripheral part	Periodically initiated
I keep a complete project plan and documentation for each project stage	31	13	7
I keep a basic project plan with *ad hoc* notes	42	58	34
I have no project plan, but I keep some notes here and there	23	24	41
I keep no written documentation at all – it is all sitting in my head	3	4	18

Table 22: Documentation of R&D and commitment to undertake R&D

Further, results showed that firms that received funding had a more systematic approach to documenting their R&D activity than those that had never received funding. Twenty percent of firms that received some sort of funding kept a complete project plan and documentation for each project stage (as opposed to 13 percent that hadn't received funding) and a further 50 percent kept a basic project plan with *ad hoc* notes (as opposed to 38 percent that hadn't

received funding). Two percent of firms kept no written documentation compared to 13 percent that hadn't received funding. Nevertheless, 28 percent of firms that received some sort of funding to undertake R&D kept no project plan, only notes.

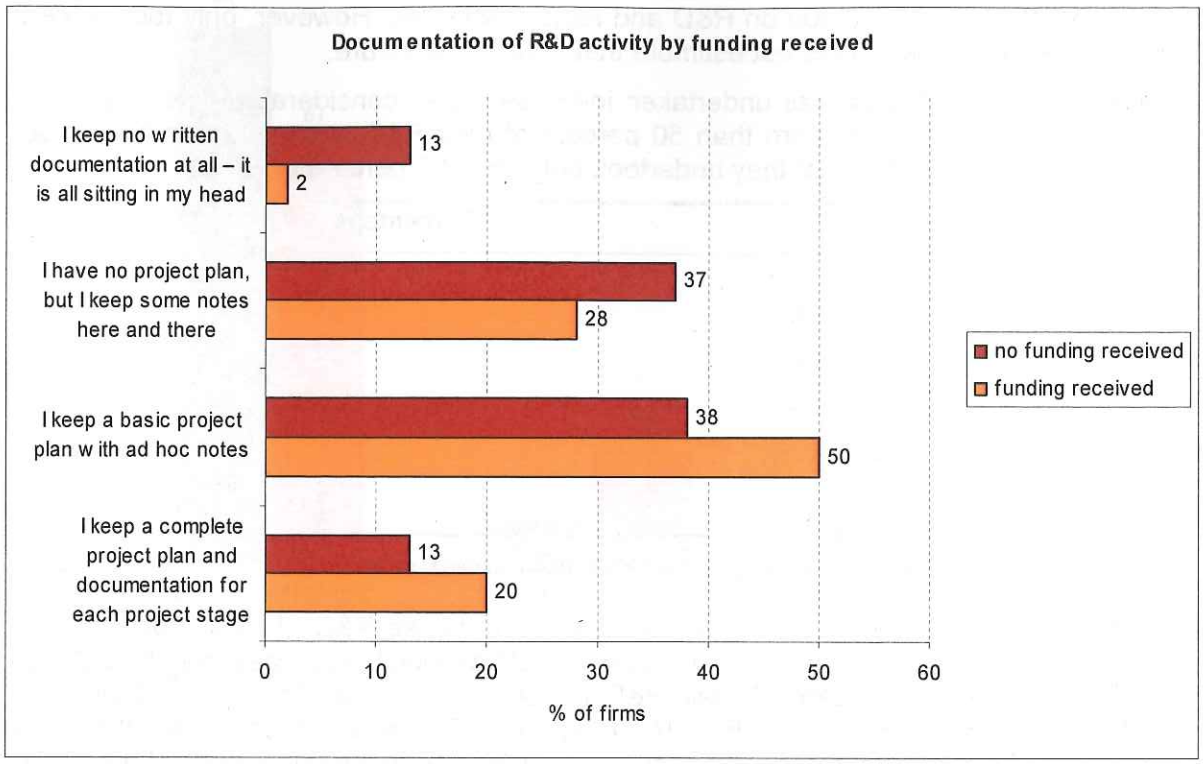

Figure 13: Documentation of R&D by funding received

RECORDING R&D EXPENDITURE

To help answer the evaluative question "What systems do firms currently have for reporting R&D expenditure?", firms were asked to indicate their total expenditure on R&D and related activities for the last 12 months, the percentage of R&D that is undertake in-house and how they record their R&D expenditure.

The breakdown of the firms' total expenditure on R&D and related activities is summarised in Table 23.

	Percentage
Zero	5
NZ$1 to NZ$10,000	54
NZ$11,000 to NZ$20,000	12
NZ$21,000 to NZ$50,000	12
NZ$51,000 to NZ$100,000	8
More than NZ$100,000	5
Can't estimate	4

Table 23: Firm's total expenditure on R&D

Overall, the figures showed that R&D expenditure in New Zealand by SMEs in the study was low. More than half of the firms (54 percent) reported R&D expenditure of less than NZ$10,000. Twelve percent each reported expenditure between NZ$11,000 and NZ$20,000

and NZ$21,000 and NZ$50,000. Expenditure over NZ$50,000 did not seem to be very common.

Eight percent of firms spent between NZ$51,000 and NZ$100,000 with only five percent spending more than NZ$100,000 on R&D and related activities. However, only four percent of firms indicated that they could not estimate their R&D expenditure.

The percentage of R&D that was undertaken in-house varied considerably. The majority of firms (54 percent) undertook more than 50 percent of their R&D expenditure in-house, but 32 percent of firms indicated that they undertook only up to 25 percent of R&D in-house.

	Percentage
Zero	2
1% to 25%	30
26% to 50%	6
51% to 75%	12
76% to 100%	42
Can't estimate	8

Table 24: Percentage of R&D expenditure undertaken in-house

Table 25 shows a breakdown of how many firms did in-house R&D of NZ$20,000 or less. About half of the firms (41 percent) that reported R&D expenditure of less than NZ$20,000 undertook less than 25 percent of their R&D in-house, while the other half (41 percent) undertook more than 75 percent of their R&D in-house. Overall it can be argued that firms that reported R&D expenditure of more than NZ$20,000 are undertaking more of their R&D in-house than firms with less than NZ$20,000.

		NZ$20,000 or less	NZ$21,000 or more
Percentage of R&D undertaken in-house	Zero	3	1
	1% to 25%	41	10
	26% to 50%	4	11
	51% to 75%	11	19
	76% to 100%	41	58

Table 25: Firm's total expenditure on R&D by % of R&D undertaken in-house

With regard to firm size, results showed that firms with more than five employees had spent significantly more on R&D and related activities in the last 12 months than firms with five employees or fewer. While 85 percent of micro-firms indicated a total expenditure of R&D of less than NZ$20,000, only 67 percent of small firms did. Although the number of firms that spent more than NZ$20,000 on R&D in the last 12 months was generally low, small firms were more than twice as likely to do so than micro-firms (33 percent of small firms compared to 14 percent of micro-firms).

In relation to the percentage of R&D expenditure undertaken in-house, results showed that firm size didn't matter.

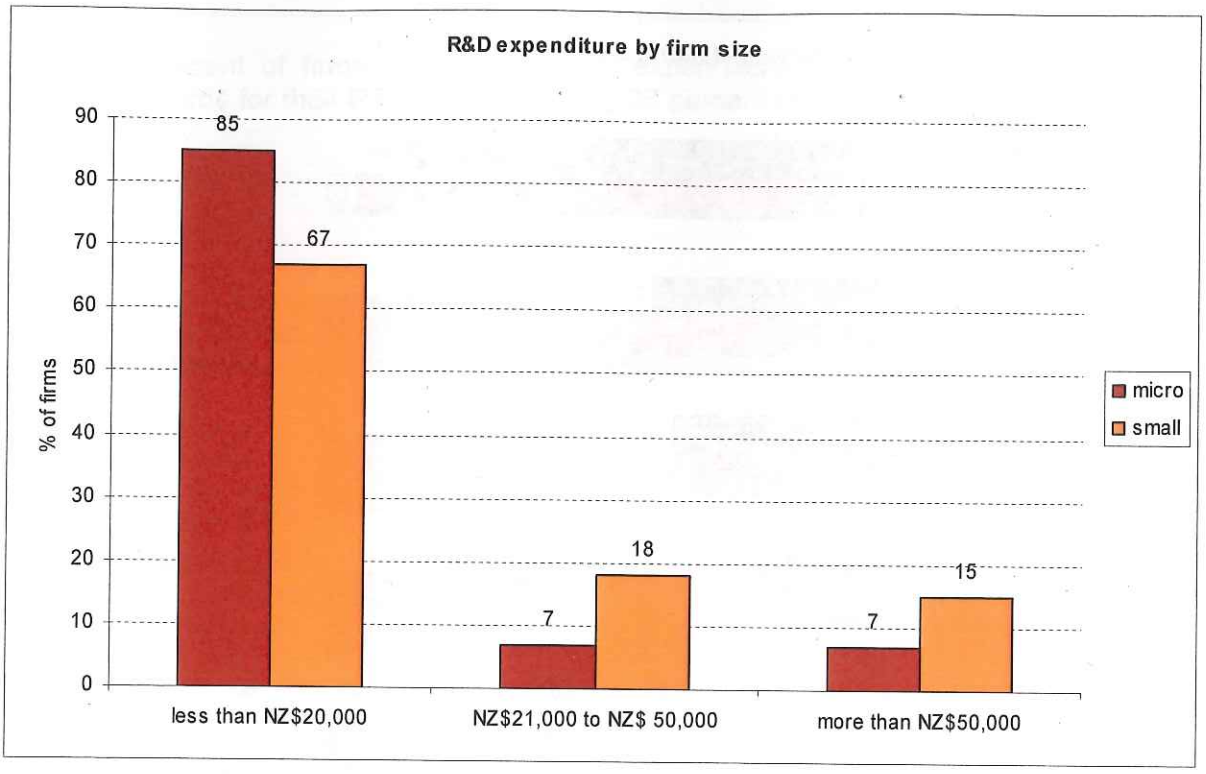

Figure 14: R&D expenditure by firm size

Asked how the firms recorded their R&D expenditures, almost half (45 percent) indicated that they kept no records at all for R&D expenses. A further 22 percent indicated that they kept no separate records but they kept timesheets. Overall, 32 percent of firms kept separate records for their R&D expenditure. While 20 percent kept separate records for the overall project only, 13 percent kept separate records at each project stage.

	Percentage
I keep separate records at each project stage	13
I keep separate records for the overall project only	20
I keep no separate records, but we have timesheets	22
I keep no records at all for the R&D expenses	45

Table 26: Documentation of R&D expenditure

While there were strong links between firm size and the firm's total R&D expenditure, no link was found between firm size and how the firms recorded their R&D expenses. Micro-firms were as likely as small firms to systematically record their R&D expenditure. Figure 15 shows the results in detail.

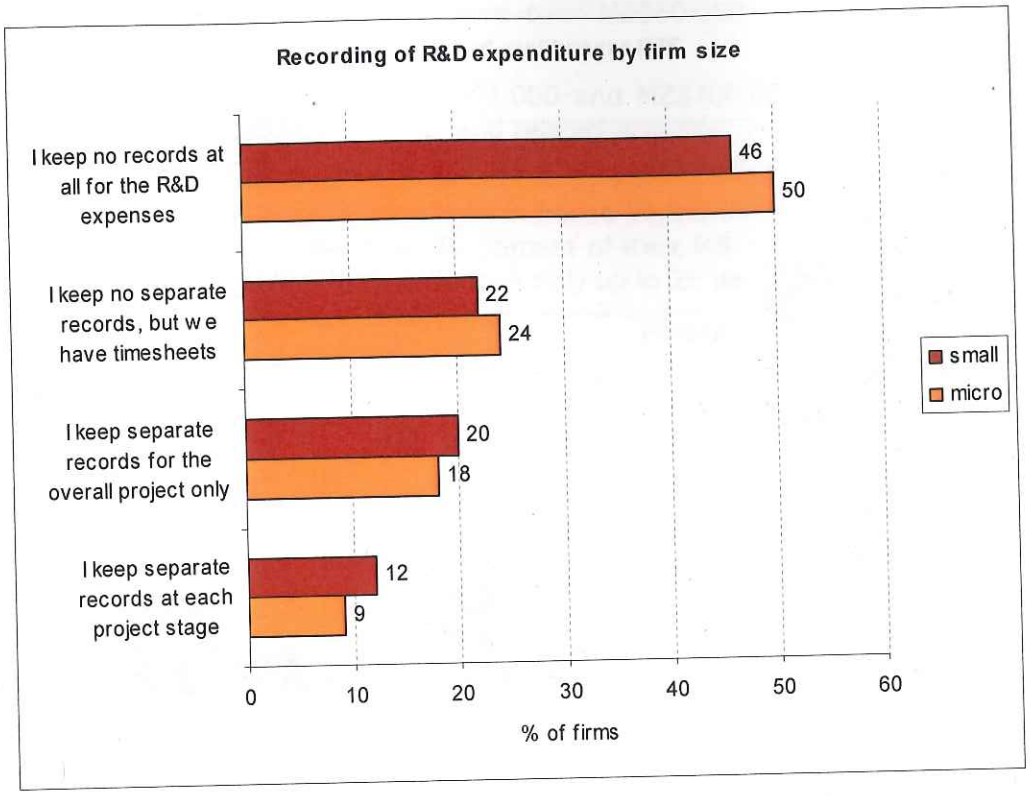

Figure 15: Recording of R&D expenditure by firm size

As with the documentation of R&D activity, results showed that there was a clear link between the firm's commitment to R&D and how systematically they recorded their R&D expenses.

Table 27 shows that firms where R&D was an integral part of the firm's activity, rather than something that was initiated periodically, were significantly more likely to document R&D expenditure systematically by keeping separate records. In firms where R&D was initiated periodically on the basis of an identified need, it was significantly more likely that no separate records for R&D expenses were kept.

	Integral and core part	Integral, but peripheral part	Periodically initiated
	%	%	%
I keep separate records at each project stage	19	6	12
I keep separate records for the overall project only	26	36	12
I keep no separate records, but we have timesheets	19	23	24
I keep no records at all for the R&D expenses	36	34	53

Table 27: Documentation of R&D and commitment to undertake R&D

Further, there was a link between the amount of R&D expenditure and the firm's recording practices. Firms with R&D expenditure of less than NZ$ 20,000 were significantly less likely to keep records of their R&D expenses than firms that had spent more than NZ$20,000.

While 48 percent of firms with a total R&D expenditure of more than NZ$20,000 kept separate records for their R&D expenses, only 26 percent of firms with less than NZ$20,000 did.

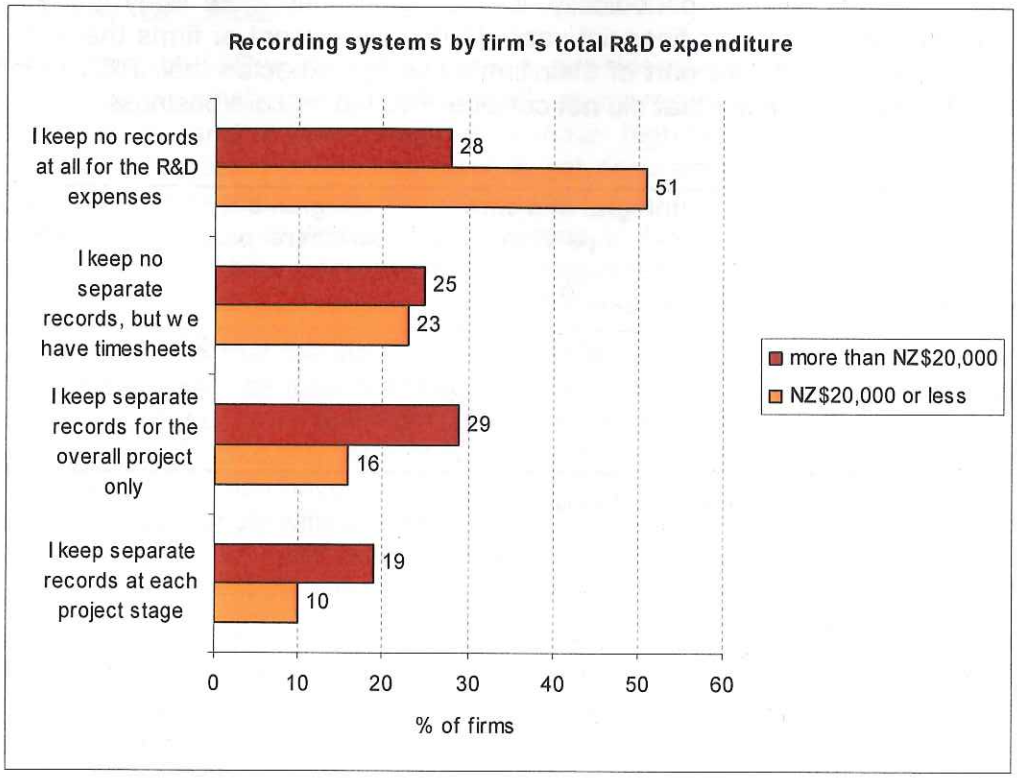

Figure 16: Recording systems by firm's total R&D expenditure

While firms that had received funding to undertake R&D had reported a more systematic approach to documenting their R&D activity, there was no such link to how the firms recorded their R&D expenditure. However, firms that received funding reported a higher total expenditure on R&D. While 39 percent of firms that received funding spent more than NZ$20,000 on R&D and related activities, only 25 percent of firms that hadn't received funding did.

CREDIT CLAIM DATA

This section addresses the fourth evaluative question "What do firms expect to happen to the amount of R&D they undertake in the next financial year?"

The majority of firms (65 percent) indicated that they expected the amount of R&D activity to remain the same for the next financial year. While 19 percent of firm expected to see an increase their R&D activity, 16 percent expected it to decrease. Those expectations were independent of firm size. Micro-firms and small firms reported similar expectations as to what will happen to the level of their R&D activity in the next financial year.

Significantly increase %	Increase %	Stay about the same %	Decrease %	Significantly decrease %
2	18	65	14	2

Table 28: Expected R&D activity in the next financial year

In line with findings in previous sections, results showed that there was a clear link between the firm's commitment to R&D and what they expected to happen to their R&D in the next financial year.

Table 29 shows that in firms where R&D was an integral part of their firm's activity rather than something that is initiated periodically, it was significantly more likely that R&D was expected to increase in the next financial year. Thirty-one percent of firms that considered R&D to be an integral and core part of their firm's activity, expected their R&D to increase compared to 12 percent of firms that did not consider R&D to be core business.

R&D activity expected to ...	**Integral and core part** %	**Integral, but peripheral part** %	**Periodically initiated** %
... increase	31	23	12
... stay about the same	55	68	69
... decrease	14	9	19

Table 29: Expected R&D activity in the next financial year

Conclusions

Definition of R&D

The understanding of R&D was expected to vary considerably within the SME sector. Some firms might not know anything about R&D at all, others might undertake R&D but refer to it by a different term, and a third group might have high-level R&D experience. For the purpose of a baseline study it was important to get accurate numbers of firms undertaking R&D. Therefore, it was decided to provide respondents with an explanation of R&D when asked whether they were undertaking or investing in R&D. Following this approach, we found that 16 percent of New Zealand SMEs that completed the survey were undertaking or investing in R&D in the last 12 months. This number was higher than expected.[11]

Overall, results suggest that the understanding of R&D by SMEs is unlikely to align with the R&D tax credit definition, as their definition is rather informal and might not cover all of the elements of the R&D tax credit definition. It can be argued that for most SMEs there was no prior internal need to record any form of R&D activity nor were there external requirements, such as reporting, that could have contributed to the development of a formal and consistent R&D definition, or to comply with a formal R&D definition. Therefore it is expected that most SMEs will be uncertain whether their R&D activities would classify as R&D as defined by Inland Revenue and, therefore, whether they would qualify for the tax credit.

However this study found that a quarter of R&D active firms have done personal study or attended a workshop to learn about R&D. Those firms were quite likely to see R&D as an integral and core part of the firm's activity, rather than something the firm initiates on an *ad hoc* basis. This small group of firms is most likely to have an understanding of R&D that aligns with Inland Revenue's requirements.

Documentation of R&D activity

To qualify for the R&D tax credit, firms need to keep sufficient documentation to provide evidence of their R&D activity.

Overall results showed that the most common practice among R&D active SMEs that completed the survey was to keep a basic project plan with *ad hoc* notes (40 percent of firms). Only a few kept a complete project plan and documentation at each project stage (14 percent of firms). It is difficult to tell from this data, if the firms that kept a basic project plan would meet Inland Revenue's requirements. It is assumed that the few firms who keep a complete project record will be more likely to qualify for the R&D tax credit. Within the group of firms that keep a basic project plan only, it is difficult to assess whether they would qualify or not. It is assumed that the required information is somehow available, so the firms might only need to improve their documentation standards and processes. However, this might be the biggest hurdle for SMEs to overcome in order to qualify for the R&D tax credit. Given the low R&D expenditure (as indicated by the firms), the compliance costs might be perceived as too high to actually generate a financial benefit from the R&D tax credit. The 59 percent of firms that kept no project plan, or no written documentation at all, are unlikely to qualify for the R&D tax credit. The fact that the R&D tax credit will now only run for one year may also be a deterrent as firms may be less likely to want to undertake the necessary investment in changing systems/processes to allow them to claim the credit, as they will not be able to spread that cost over a number years/claims.

[11] The Business Operations Survey (BOS) 2005 found that seven percent of firms had undertaken or funded R&D in the previous financial year. Six percent of firms with six to 19 employees reported R&D activity and seven percent of firms with 20 to 49 employees also reported this.

Firms that received some sort of funding for their R&D activity were more likely to have a more systematic approach for documenting their activities. The same applies for firms that undertake R&D as an integral and core part of their firm's activities.

RECORDING R&D EXPENDITURE

To qualify for a 15 percent R&D tax credit, firms have to meet the minimum threshold of NZ$20,000 of eligible expenditure carried out in house, or must outsource work to a listed research provider.

The R&D expenditure reported by the firms surveyed was comparably low. Only about one third of firms spent more than NZ$20,000 on R&D in the last 12 months. These firms were twice as likely to be "larger" in size, i.e. employing six to 49 employees. However, figures on self-reported R&D expenditure in small firms are problematic, because small firms tend to underestimate their R&D expenses.[12] Underestimation results from the way R&D is undertaken in small firms – mostly informal, across all operational areas of the firm rather than in a specialised department with limited managerial resources, no internal need or external requirement to record R&D expenditure and limited knowledge about the full range of eligible expenditure. Overall results showed that firms that reported R&D expenditure of more than NZ$20,000 were undertaking more of their R&D in-house than firms who spent less than NZ$20,000.

To qualify for the R&D tax credit, firms need to record their expenditure to support their claim. Although the records required to claim the R&D tax credit are similar to those required for other tax purposes, R&D expenditure needs to be separately identified.

Results showed that almost half of the firms (45 percent) indicated that they kept no records at all for R&D expenses, not even separate timesheets. Those firms are unlikely to meet Inland Revenue requirements. From the remaining firms one third (32 percent) already kept separate records for their R&D expenditure. It is assumed that these would meet the requirements, possibly with some adjustments to their existing practices. 22 percent indicated that they kept no separate records but did keep timesheets. Based on the survey information it is not possible to assess to what extent these firms might need to improve their recording practices. The same note of caution regarding the perceived compliance costs, as noted earlier applies here.

While firm size mattered when it came to the amount of R&D expenditure, it didn't matter when it came to recording practices. However, the firm's commitment to undertake R&D as an integral and core part of their firm's activity was again an important factor.

CREDIT CLAIM DATA

Only 19 percent of firms expected to increase their R&D activity in the next 12 months, 65 percent expected it to stay about the same and 16 percent expected it to decrease. Again there was a clear link between the firm's commitment to R&D and what they expected to happen to their R&D in the next financial year.

Overall, results show that SMEs are active participants in R&D, with the potential to make a valuable contribution to the New Zealand economy.

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[12] Roper, S. (1999). Under-reporting of R&D in small firms. The impact of international R&D comparisons. Small Business Economics, 12, p.131-135.

HOW WELL PREPARED ARE R&D ACTIVE SMALL FIRMS TO CLAIM THE R&D TAX CREDIT?

This section provides a summary of evaluative findings with the objective to identify how well prepared R&D active, small firms are to claim the R&D tax credit. Figure 17 summarises the number of firms that are R&D active, and keep appropriate documentation of R&D activity and appropriate records of R&D expenditure.

Results show that 53 percent of R&D active firms keep appropriate documentation of their R&D activity either through a complete project plan or a basic project plan. Thirty-eight percent of R&D active firms kept appropriate documentation of their R&D activity and appropriate records of their R&D expenditure. The detailed figures for each subgroup are shown in the figure below. All percentages shown in the figure refer to the number of R&D active firms (n=252).

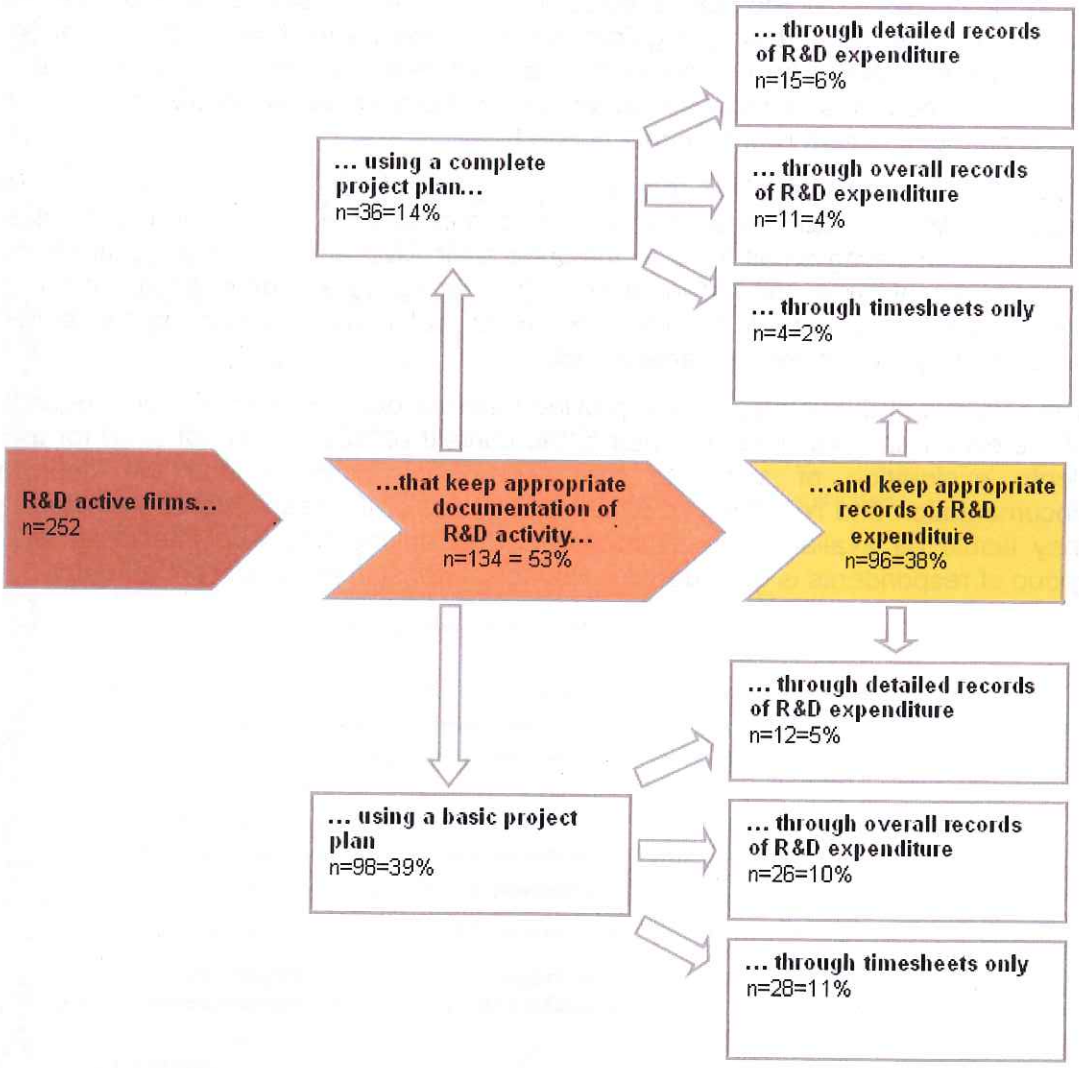

Figure 17: Small firms' preparedness to claim the R&D tax credit[13]

[13] There might be slight variations to the numbers in the previous chapters due to rounding and how respondents answered.

Next steps

- Results showed that there is considerable scope to develop SMEs' understanding of R&D. But to engage SMEs successfully, learning has to be linked to their firm's activity and their strategy. Ideally, the understanding of R&D has to be simultaneously developed with the firm's commitment to R&D as a core part of their activity. This learning and development process has to be guided by the so-called "trusted advisers". Although tax accountants are generally regarded as "trusted advisers" within the SME sector, results showed that industry associations and other firms ("peers") might be important sources for SME support. Government agencies are clearly not seen as a significant source of information.
- Given the low R&D expenditure (as indicated by the firms), the compliance costs might be perceived as too high to actually generate a financial benefit from the R&D tax credit. Specific and simple guidelines or templates on how to document R&D might assist SMEs to comply with the requirements. Most importantly those templates need to take into account the informal processes within SMEs and should focus on the minimum requirements needed.
- Overall, results showed that the firm's commitment to R&D enhances the firm's understanding of R&D, and improves its documentation and recording practices. Therefore, assisting small firms to integrate their R&D activities into the firm's core activities might be a good starting point for interventions. Some small firms might have good technical skills to undertake R&D, but can't capitalise on the benefits because they are lacking managerial skills.
- The purpose of this survey was to provide baseline data to inform the understanding of the extent and practices of SMEs in the context of R&D. It did not allow for the in depth exploration of some of the issues that arose around the definition, documentation and recording of R&D. Almost half of the respondents indicated that they would be available for an interview. Undertaking follow-up interviews with a group of respondents is considered a valuable extension of the current research.

Appendix A

Section B: Innovation

In this section we are interested in learning about the process of developing, adopting and implementing new and better products, services, process and organisational mechanisms in your firm.

For the purpose of this survey innovation is broadly defined. It includes the development or introduction of any new or significantly improved activity for this firm. This includes products, processes and methods that this firm was the first to develop and those that have been adopted from other organisations.

16 In the last 12 months, did this firm INTRODUCE any:

- new or significantly improved products or services onto the market ..... Yes ☐ No ☐

  Exclude the simple resale of new products or services that were wholly produced and developed by other firms

  If YES, were any of those new or significantly improved products or services
  - ☐ developed by your firm
  - ☐ developed by your firm in partnership with others
  - ☐ obtained from others and significant improvements were made by this firm
  - ☐ obtained from others and NO significant improvements were made by this firm

- new or significantly improved operational processes ..... Yes ☐ No ☐

  (ie methods of producing or distributing products or services)

  If YES, were any of those new or significantly improved operational processes
  - ☐ developed by your firm
  - ☐ developed by your firm in partnership with others
  - ☐ obtained from others and significant improvements were made by this firm
  - ☐ obtained from others and NO significant improvements were made by this firm

- new or significantly improved organisational/managerial processes ..... Yes ☐ No ☐

  (ie significant changes in this firm's strategies, structures or routines)

  If YES, were any of those new or significantly improved organisational/managerial processes
  - ☐ developed by your firm
  - ☐ developed by your firm in partnership with others
  - ☐ obtained from others and significant improvements were made by this firm
  - ☐ obtained from others and NO significant improvements were made by this firm

- new or significantly improved sales or marketing methods which were intended to increase the appeal of products or services for specific market segments to gain entry to new markets ..... Yes ☐ No ☐

  If YES, were any of those new or significantly improved sales or marketing methods
  - ☐ developed by your firm
  - ☐ developed by your firm in partnership with others
  - ☐ obtained from others and significant improvements were made by this firm
  - ☐ obtained from others and NO significant improvements were made by this firm

If you have answered ALL four questions with NO, please go to Question 30. Otherwise, please continue with Question 17

17 For the last 12 months, please estimate the percentage of sales that came from the introduction of innovative products, services, processes or methods as specified in Question 16?

- ☐ Zero
- ☐ Less than 10%
- ☐ 11% to 25%
- ☐ 26% to 50%
- ☐ 51% to 75%
- ☐ More than 75%
- ☐ Can't estimate

18 What were the reasons that you engaged in innovation activities?

	1 Strongly agree	2 Agree	3 Neither agree or disagree	4 Disagree	5 Strongly disagree
To improve productivity	☐	☐	☐	☐	☐
To increase revenue	☐	☐	☐	☐	☐
To reduce costs	☐	☐	☐	☐	☐
To increase responsiveness to customers	☐	☐	☐	☐	☐
To establish/exploit new market opportunities	☐	☐	☐	☐	☐
To improve work safety standards	☐	☐	☐	☐	☐
To reduce energy consumption	☐	☐	☐	☐	☐
To reduce environmental impact	☐	☐	☐	☐	☐
To replace products or services being phased out	☐	☐	☐	☐	☐

19 Which is the single most important factor that hampered your innovation activities? *Please tick one*

- ☐ Lack of access to capital
- ☐ Innovation costs too high
- ☐ Lack of qualified staff
- ☐ Lack of ability to use new technology
- ☐ Difficulty in finding cooperation partners for innovation
- ☐ Competition activity in the same market
- ☐ Hard to protect intellectual property
- ☐ Government regulation or policy
- ☐ Lack of market demand for innovation
- ☐ No need due to prior innovations

20 Which of the following do you consider sources of ideas or information for innovation?

	1 Very likely	2 Likely	3 Neither likely or unlikely	4 Unlikely	5 Very unlikely
Employees	☐	☐	☐	☐	☐
Industry associations	☐	☐	☐	☐	☐
Other businesses	☐	☐	☐	☐	☐
Customers	☐	☐	☐	☐	☐
Suppliers	☐	☐	☐	☐	☐
Accountant, lawyer, banker	☐	☐	☐	☐	☐
Professional adviser, consultant, business mentor	☐	☐	☐	☐	☐
Research organisations (universities, polytechnics, Crown research institutes or other)	☐	☐	☐	☐	☐
Government agencies	☐	☐	☐	☐	☐
Family, friends	☐	☐	☐	☐	☐
Books, journals or internet	☐	☐	☐	☐	☐

21 In the last 12 months did your firm ENGAGE in the following activities:

- Acquisition of machinery, equipment and software ..... Yes ☐ No ☐
  Acquisition of advanced machinery, equipment and software to produce new or significantly improved products or processes.
- Acquisition of external knowledge ..... Yes ☐ No ☐
  Purchase or licensing of patents and not-patented inventions, know-how and other types of knowledge from other firms or organisations
- Training of employees ..... Yes ☐ No ☐
  Internal or external training for your staff specifically for the development or implementation of new or significantly improved products or processes.
- Marketing of new or significantly improved products ..... Yes ☐ No ☐
  Activities for the market introduction of your new or significantly improved products like market research or launch advertising
- Undertaking of Research and Development (R&D) or investing in R&D ..... Yes ☐ No ☐
  R&D is investigative work which is directed at acquiring new knowledge or developing new or improved materials products, devices, processes or services to solve problems for your firm or your customer. It involves an element of novelty and originality. It can be undertaken in-house or subcontracted to another firm or research organisation. Your firm does not need to have a formal R&D department or a dedicated R&D team to classify for R&D.
- How do you know whether your firm engages in R&D or not?
  - ☐ I go with my gut feeling
  - ☐ If our R&D person, technician or contract provider does it, then it's R&D
  - ☐ Our tax accountant, or equivalent, will tell me
  - ☐ I have done some personal study or attended a workshop to learn about this

If you have answered YES to RESEARCH & DEVELOPMENT, please continue with Question 22.
Otherwise, please go to Question 30.

22 Which of the following statements apply to your firm's commitment to R&D?

- ☐ An integral and core part of the firm's activity
- ☐ An integral, but peripheral part of the firm's activity
- ☐ Something the company initiates periodically when there is a recognised need

23 What sort of records do you keep of your R&D projects?

- ☐ I keep a complete project plan and documentation for each project stage
- ☐ I keep a basic project plan with ad hoc notes
- ☐ I have no project plan, but I keep some notes here and there
- ☐ I keep no written documentation at all – it is all sitting in my head

24 For the last financial year, please estimate your firm's total expenditure on R&D and related activities

- ☐ Zero
- ☐ NZ$1 to NZ$10,000
- ☐ NZ$11,000 to NZ$20,000
- ☐ NZ$ 21,000 to NZ$50,000
- ☐ NZ$51,000 to NZ$100,000
- ☐ More than NZ$100,000
- ☐ Can't estimate

25 Please estimate the percentage of your R&D expenditure that is undertaken in-house?

- ☐ Zero
- ☐ 1% to 25%
- ☐ 26% to 50%
- ☐ 51% to 75%
- ☐ 76% to 100%
- ☐ Can't estimate

26 Which of the following best describes how you record your R&D EXPENDITURE?

- ☐ I keep separate records of R&D expenditure at each project stage
- ☐ I keep separate records of R&D expenditure for the overall project, but not at each project stage
- ☐ I keep no separate records of R&D expenditure, but we have timesheets that can be used to figure out time spent on an R&D project
- ☐ I keep no records at all that could be used to identify R&D expenses

27 Has this firm ever received funding from any of the following organisations?

- ☐ Foundation for Research, Science and Technology (FRST) e.g. through TechNZ or Technology for Business Growth (TBG)
- ☐ New Zealand Trade and Enterprise (NZTE)
- ☐ Other, *please specify* _____

28 What benefits has your firm gained through undertaking R&D in the last 12 months?

	Yes	No	Don't Know
• Improved productivity	☐	☐	☐
• Increased revenue	☐	☐	☐
• Reduced costs	☐	☐	☐
• Increased responsiveness to customers	☐	☐	☐
• Increased market share	☐	☐	☐
• Established or exploited new market opportunities	☐	☐	☐
• Improved work safety standards	☐	☐	☐
• Reduced energy consumption	☐	☐	☐
• Reduced environmental impact	☐	☐	☐
• Replaced products or services being phased out	☐	☐	☐

29 In the next financial year do you expect your firm's R&D to:

1 Significantly increase	2 Increase	3 Stay about the same	4 Decrease	5 Significantly decrease	6 Don't know
☐	☐	☐	☐	☐	☐