

# A research policy for New Zealand: a personal view

THERE are two general aspects to the problem of R&D in this country — its level and organisation.

The main problem is the low level of R&D, rather than ineffectiveness. Some of the points are therefore "more of the same", whereas others require changes in policy, at least for the majority of companies.

What we need from the Government are not hand-outs, but leadership. The policy followed for the last 40 years has led to continued devaluations as we followed a cheap labour, low skills, strategy. We do not have the option of a rare commodity (for example, oil) leading to a high standard of living despite low R&D. Selecting a strategy of high added value depends upon skilled inputs.

If we are to have a strategy of high skills and knowledge then it needs a commitment to high R&D from the whole Government. The lone voice of a Minister of Science calling from the wilderness is not enough.

When looking at other countries, Sweden seems to come closest to being a model for New Zealand. As a small country Sweden has developed priority areas. Not surprisingly these include the technical areas of their main industries together with associated basic research. However, they include many subsidiary areas including social, cultural, environmental, health and management aspects.

The main difference from New Zealand is their high R&D (2.5% of GDP at latest estimates, rather than less than 1% as in New Zealand). An important strength is that the

New Zealand spends less than half the current OECD average on research and development while other countries are still increasing their spending in this area. Far more must be spent in New Zealand to maintain, let alone improve, our living standards, says independent researcher **David Penny**. In this final of his series he suggests 2% of GDP would be modest by OECD standards.

whole country, particularly industry, is committed to a high skills approach.

Establishing a target is not easy but 2% of GDP is the current average in the OECD. Many countries have increased their R&D spending since the latest figures were released. These range for Italy increasing from 0.8% to about 1.3%, Sweden from 1.9% to 2.5%, and Japan is considering a 10-year target of about 3.5% (up from about 2.2%). A target for us of 2% of GDP, over a medium-term period, would still be modest by world standards. We must keep running even to maintain our present position.

First it is necessary to accept that R&D is an ongoing cost. It is no longer a luxury, but a basic cost in the running of an industry. We cannot afford to leave R&D to governments to finance from tax revenue. However, it is going to be difficult to develop this in a private sector apparently geared to making money be takeovers and capital gains, rather than developing major new ideas and products.

Certainly, a policy such as 150% tax deductions for R&D will be essential in the short term, but probably not desirable after 10 years of a successful policy. There is an element of defensiveness in these tax deductions in that as the

Australians develop their own R&D we will lose most of our bright graduates, thus reinforcing the downward spiral.

There cannot be one simple solution for the private sector because it depends on both the nature and structure of the industry. The table shows the variation in levels of spending on R&D in different English industries. The level of research activity does vary with the industry.

Another factor is the small size of many of our units in primary, secondary, and service industries. This has led to the development of the industry research associations and remains an important model for applied research. However, our larger industries must have their own research groups for several of the reasons given in my second article.

Despite everything that is written it is still a difficult task for a company to develop a research group. In the short term it may require more than just tax incentives. One possible way is to establish sector agreements on the minimum level of research activity in an industry.

Once a minimum level is agreed upon (say 1% of turnover) then it is up to each company to decide how it is spent. They may have their own R&D, spend the money through an industry research

association, contract the work to the Government, university or private laboratories, or come to an agreement with a company that spent more than the minimum. If it is not spent then it reverts to the Government to allocate — it is unlikely that this would happen. The agreement would have to cover multinational companies but with our cheap labour costs it should be an attractive arrangement.

Such agreements would have to run for about 10 years. After that R&D should have to prove its worth without industry agreements or special tax write-offs. The difficulty is in getting R&D established as a major activity in the private sector, particularly for an area where many of the benefits are not immediate.

Perhaps the bright spot in the private sector is the way that New Zealand business has taken on the need for a marketing approach. New product development is a logical extension of marketing as it builds on the company's existing expertise as a way into more advanced R&D. For many companies this will still be low or medium-technology. High-technology will probably need either large companies or industry based co-operative research associations.

Some existing institutions should be financed by the ap-

propriate industry. Probably Ruakura should be supported by its industry, rather than by general taxation. But however they are financed, it is essential to keep established groups intact.

Finally, the tax laws need to be changed so that capital gains are taxed normally. In the present system it is too easy for companies to play the capital gains, takeover game. It is going to be hard work to go for the high skills strategy, but in the medium and long term it is essential for international competitiveness.

In many ways much of the background work on policy has been done. We know we spend little money on R&D, we have had sector reviews by the NRAC, and now we have a biotechnology report from the DSIR. The next step is urgent. It is implementation, particularly getting the private sector into action. The technology conference next month is a vital first step.

The NRAC needs to continue its important work on reviewing New Zealand science and technology and stimulating interest in R&D. We should follow its suggestion of making it a more broadly-based body, particular if it wishes to review basic science.

There must be some alteration of the method for advising the Government. The present system does put heads of Government research in a conflict of interest situation. They must both advise the minister on what is good for the country, but need to keep the interests of their own department in mind. It is not surprising that so much of Government research

gets spent in Government departments. The problem is not with heads of departments, it is the politicians who allowed such a system to develop.

Most governments bring in some outside science advisers on two-three year contracts to ensure a wider input of information. Why not New Zealand?

The temptation must be avoided of too much centralised control of science and technology policy. There are areas where centralised control has been effective. The French have a very centralised system and found that it worked for some large projects such as nuclear power stations and for military systems. In biotechnology they are being forced to leave more initiative to the local level.

There must be independent monitoring of the effectiveness of research groups. This can be done by analysing numbers and citations of publications in different areas and institutions, recording patent applications, etc. This proposal will be strongly resisted by those who want the power to make decisions based only on intuition and guesswork.

The function of central management should not be to decide in detail which projects will, or will not, work. The practising scientist is usually in a better position to decide what is realistic in a given time-frame.

Central management must have an overall strategy, and then be able to reward those who produce results.

It is also important to iden-

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# Research policy

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tify areas where more activity may be needed. I was surprised at how few publications came for the Wool Research Organisation. However, the associated manufacturing industry is apparently happy with the technical advice it receives so it must be the basic research on wool that is weak within New Zealand. It may not be many years before someone else genetically engineers a new wool protein and could wipe us out. With a high research and promotion levy on wool, and lower research costs in New Zealand, more of the basic research should be carried out here.

There must be a review of the effectiveness of medical research in relation to the health of New Zealanders. We will probably need to broaden the Medical Research Council to become a Health Research Council. Certainly the present performance is not satisfactory as New Zealand has some of the worst health statistics in the developed world.

There is still a need to encourage a higher proportion of the brightest secondary students to go into a wider range of areas than just medical and physical science. These students are conservative and go into the prestige areas of 30 years ago. Now the most effective areas are biological science and computing.

### Low productivity

The major problem seems to be low productivity in R&D. There are already efforts to increase accountability and gain more outside contracts. But in the words of one former Government scientist, "they need a challenge".

Over the last few years there has been a major cut in promotion expectations of the younger scientists because of "percentage controls" on the number of scientists at each salary level. Many feel there is little prospect of promotion from good research alone because the next salary level already has its maximum level of occupants.

The problem is compounded by the "tracks" to which scientists are allocated very early in their career. Somebody placed in a fast track will get rapid promotion. But to be placed in a lower track means they will not get very far, even doing extremely good research.

One possibility, there are many others, is to follow other countries that allow contract arrangements as an option for government researchers. There could be, say, five-year con-

tracts as research scientists. These would not be subject to percentage controls and people could still be members of public service for superannuation etc. Only a position as a research scientist would be negotiable. This would encourage and reward performance, renewal would be on guidelines established at the beginning of the five-year period.

Government scientists should be allowed, and encouraged, to develop private contacts in their areas of expertise. Many overseas countries now have science parks associated with universities. In New Zealand most of the research money has gone into Government laboratories but their rules discourage spin-off companies from developing.

Outside contracts are arranged by Government laboratories with industry or with other Government departments but scientists still feel they do not see the direct benefits. A trading division of DSIR could help considerably.

This has been discussed in more detail in the previous article and so will only be mentioned here briefly. They have an effective research record, but are seriously under-funded by OECD standards. There is a major need for competitive funds for large projects. Certainly, universities should be allowed to compete for major projects, both private and public, basic and applied.

The Minister of Education should ask the Grants Committee for a review of the needs of graduate education. Almost certainly a good plan can then be put into action, but if it isn't the Government could tackle the problem itself.

### School system

Similarly, it is time to examine the low participation and narrowness of the upper high school and tertiary education system. Because it involves the high schools it needs to come from the Minister of Education. It is most unfortunate that the political actions of secondary teachers have forced a review of the entry to universities before more basic questions are tackled.

NRAC overseas fellowships should be abolished; they are too expensive and a knife in the back for the universities. The money saved can be spent in New Zealand to get a proper graduate education in New Zealand, but only if the universities bring their regulations up to international standards. When it is worth it, Government divisions should be able to use their own funds to bring

in overseas people.

At present the maximum donation for scientific research that is tax exempt is \$5000, unless prior approval is obtained from the Minister of Finance. This limit must be

removed.

In New Zealand universities there is extremely little basic research on the molecular biology of plants, the basis of agriculture, horticulture and forestry. The only regular

source of funding for basic molecular biology is for medicine, consequently that is where any effort is concentrated.

It should be made easier to get adequate research funding

for people in polytechnics.

There is an urgent need for a network of scientific databases and programs. These have been well established for five years

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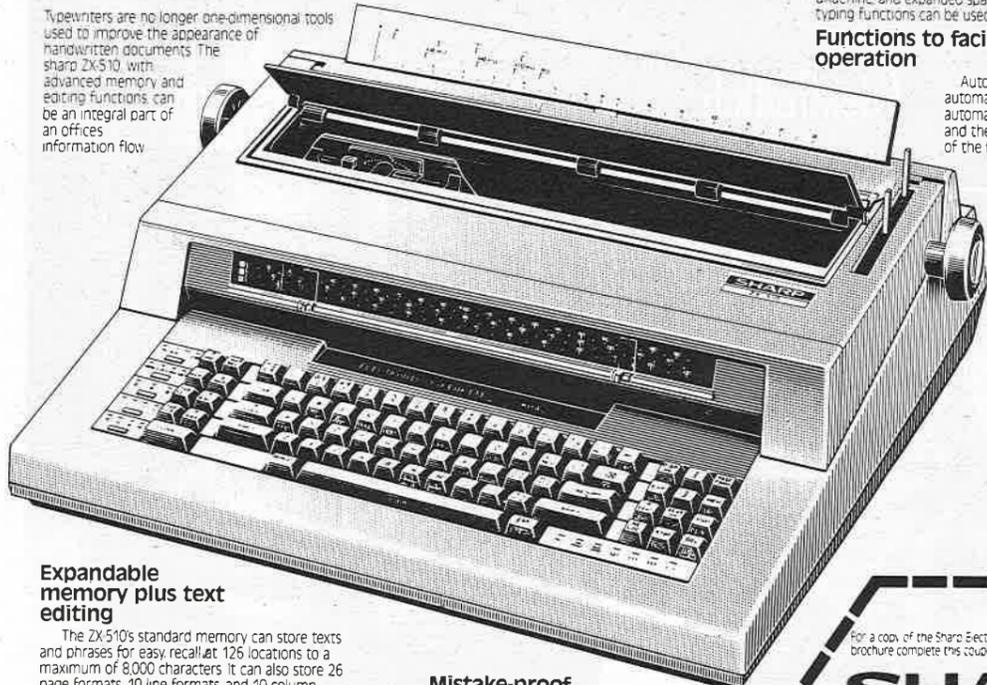
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### Easy, fast proofreading

The ZX510 has a 32-character fluorescent display for proofreading before printing. Stored text can be scrolled on the display for easy and fast checking and editing.

TABLE 1

Total	Coal/ petroleum/ chemicals	Metal manufg/ engineering	Others
Under 1%	20	17	27
1-2.99%	38	32	38
3-5.99%	28	27	27
6% & over	14	23	8
	100	100	100

The percentage of annual budget spent on research, design and development in English companies, grouped by industries. There is considerable variation between companies, some of which is associated with the type of industry. For comparison, the latest figures for average spending on R&D in New Zealand's private sector is 0.15%.

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# R&D activity

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in North America. New Zealand is an ideal size for such a network but there are major administrative difficulties in getting them established here as each Government department and university thinks mainly of its own needs.

The DSIR has an excellent nucleus for such a network. However, it will get increasingly overloaded with administrative, rather than scientific work, despite the fact that apparently Government approval has not been obtained for the administrative aspects. In any joint project the universities should use the Spectrum system of project control.

In conclusion, R&D in New Zealand needs to be at least doubled. It is essential to start action on the problem of our low level of activity in this area. Clearly many of the points raised are my own personal views. They are not the last word but

a challenge to others to do better. You may not agree with my specific suggestions but we must face the major issue of low R&D in New Zealand. We must not look for points of disagreement, but look for common ground leading to an improved performance.

A large number of sources have been used including the reports to Parliament by NRAC, together with their reports on science and technology in New Zealand. Other important sources are the OECD Science and Technology Indicators Unit, Science Citation Index, Science Indicators 1982 of the United States National Science Foundation, OECD annual reports on the economies of member nations, and *The University, Science and the Community* by Professor Matthews. *Nature* and *New Scientist* have regular articles on science policy for many countries.

by Stephen Bell

THE Post Office Savings Bank plans to install fast cash dispensers in some of its branches to speed service to the customer with a straight forward withdrawal transaction.

A pilot phase will see three or four of the limited-function automatic teller machines installed by mid-year.

Like the "through-the-wall" Anytime ATMs already used by the POSB, the new machines will be connected into the EFTS Ltd network, a joint venture of the United Building Society and Challenge Computers.

This is EFTS Ltd's first essentially new move, the company having inherited the United Building Society and Anytime networks from its partners.

Given the success of the initial machines, the POSB will begin to spread them further through the country. Unlike the Anytime terminals, they will be owned by the savings bank itself, and will initially

# Faster cash from Post Office

give access only to POSB accounts.

Anytime machines cater for the account-holders of a swag of building societies as well, and EFTS Ltd has amalgamated them with United's network of "money machines".

The POSB had no objection in principle to its new cash dispensers being open to the cards and accounts of United and Anytime members, said spokesman Colin McKay. In fact, given the central EFTS

facility, it would make some sense. But such a course was clearly dependent on the other card operators, he told *NBR*.

The cash dispensers would have a fundamentally different role from the Anytime machines. They were not designed to cater for customers outside opening hours, but for people in a hurry. "They will be slightly quicker (than dealing with the human teller) and could help alleviate some of our traffic problems," he said.

The machines will be supplied by Philips Industries, which has a long-term contract with the Post Office for terminal supply.

EFTS Ltd's ultimate thrust is into electronic funds transfer at point of sale (eftpos). Was there a possibility of electronic payment facilities in post offices in due course?

"We are working closely with EFTS," said McKay, "and we are keeping in touch on eftpos."

# Justice Dept to boost database

by Stephen Ward

THE Justice Department's commercial affairs division is planning to extend the range of information it holds on computer.

In the current financial year it hopes to feed in its bankruptcy records into the division's

database in Wellington.

Besides names, expiry dates of bankruptcies — normally three years after an order — will be included.

The division's Wellington executive officer Lawrence Roberts told *NBR* that this operation will be the second phase of work initiated in 1983.

Before computerising bankruptcies, of which Roberts said there were currently about several thousand, it had been decided to access names of all companies around the country.

With about 400,000 such firms use of a card system for files had become "unwieldy".

Computerisation would allow easier checks in the event, say, of a need to find out if the name of a company seeking registration clashes with one already incorporated.

Work on the bankruptcy records, however, is not yet

under way.

Roberts said information on the database will be available to anyone.

Meanwhile, the division is also considering ways of beefing up the "calibre" of information it stores on another in-house database (which the public can get access to for a price).

Commercial affairs assistant secretary Kevin McCormack says ideas on this are still at an early stage.

Auckland credit reporting operation Databcorp (*NBR*, April 8) is intending to put together comprehensive computer lists of the directors and shareholders of every company wound up in the area in the past 10 years.

Information stored would be cross-indexed.

Every bankruptcy in New Zealand since 1975 would also be included.

# Tender extension

by Stephen Ward

THE closing date for tenders to supply the Post Office with mobile radio and telephone networking equipment, which was to have been in February, has now been extended with decisions on successful bids expected soon.

NZPO director of supply Frank MacKinnon told *NBR* the extension was granted because some companies are still developing their networking systems.

Acting director of Telecom marketing Norm Nichols says the first of these tenders will be for "cellular radio" mobile

telephone networks, which allow users to dial into the ordinary telephone system.

The second will be for "trunked" mobile radio networks. These differ from ordinary "despatch" radio services in that free channels linking user and base are automatically selected and mobile users are able to roam further afield without losing contact with the base.

The Post Office has written to the electronics industry suggesting it will be providing these sorts of networks with the private sector marketing suitable hardware to make use of them.



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