



IPENZ Informatory Note Two

Policy and Leadership Framework for Wealth Creation in New Zealand

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Other Informatory Notes:

i. The Role of Engineers in Developing National Wealth

ii Climate Change - An Engineering Perspective

iii. Educational Policy for a Technically Literate Society

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The Institution of Professional Engineers New Zealand (Inc) is the non-aligned professional body for engineering and technology professionals in New Zealand. It seeks to contribute to the wider community in matters of national interest or concern. One part of its contribution is to present informatory notes, such as this note, which give a learned view on an important issue, this view being derived independently of any commercial interest. Others are free to quote from or use the material in this note.

Foreword

In a previous contribution IPENZ has presented its situation analysis of New Zealand's readiness to harness the benefits of a Knowledge Economy/Society. In this new contribution we seek to present our views on specific policy and leadership actions we believe will best serve the nation. Before presenting these we wish to repeat some basic premises that underpin our argument.

What is a knowledge economy in a New Zealand context?

- The basis of the wealth-creating sector within a Knowledge Society/Economy is us having knowledge that others don't have and being able to utilise it in a unique way to create or fill a market need (wealth creation through competitive advantage).
- That knowledge can be derived from many diverse sources including the arts and heritage, not just science, technology and engineering, but the delivery of the knowledge will be increasingly through technology.
- Our Pacific "heritage" assists Maori to participate in wealth creation, as well as through their participation in the arts, science, technology and engineering.

What does a knowledge economy mean for New Zealand?

- A strong New Zealand demands a growing and vibrant wealth-creating sector, perhaps employing only a small part of our workforce, but this sector will provide the income which our remaining economic and social activities distribute to all New Zealanders.
- The wealth-creating sector must be able to stand unsubsidised in the global market, paying globally competitive rates for people with the right skills and knowledge, even though these rates of remuneration may not be able to be extended through the wealth-distributing sector.

What is meant by innovation and entrepreneurship and how do they relate to business?

- Innovation starts with creating new and useable knowledge or new ways of using existing knowledge (intellectual property - IP) and extends to development of a new product, process or service from the knowledge.
- Entrepreneurship describes the actions required to realise innovations in tangible ways to create new products or services that can be sold or licensed profitably.
- Business skills are vital to support innovators and entrepreneurs thereby ensuring that the maximum possible benefit is obtained from any innovation.
- In themselves business skills are not sufficient nor even necessarily the most vital element in wealth creation – directors must be IP-literate, knowing how IP is nurtured and exploited.

Who are the drivers of wealth creation?

- In the long term, even well-off consumers are prepared to pay only commodity prices except for fashion/entertainment and health/well-being/safety products – all other goods ultimately will reduce to commodity level, with ongoing cost reduction research needed to continue to make a profit from ever-diminishing returns on production
- "Post-industrial companies" making knowledge-based products will spend 5-10% of their expenditure for creating new IP, demanding a highly-skilled and tertiary-educated workforce

What are the implications for New Zealand and its Government policy?

- Because cost-reduction research keeps an existing industry sector viable it is core business for that industry sector to fund the bulk of such research itself. In contrast new products research will often be in areas which do not align it with existing industry sectors meaning that less private investment in the research can be expected.
- Government investment must be targeted to grow the wealth-creating sector by leveraging private sector investment whilst ensuring that social and environmental goals are not at risk.

What types of organisations will prosper in our wealth-creating private sector?

- Future successful companies will have a low reliance on physical assets and raw material pricing. Industries based on perishable materials will survive only whilst their products have intrinsic IP value (and not be reliant on only low production cost)
- Labour-intensive manufacturing using transportable materials will be increasingly non-competitive (due to increasing access of any manufacturer to low labour costs elsewhere), and we cannot afford that it be subsidised long-term.
- Knowledge-rich (e.g. highly automated) manufacturing can be based here, particularly making goods for niche markets and service product creation (e.g. health products, entertainment) and export of services (e.g. professional engineering expertise) can grow.

In March 2001, at IPENZ Congress 2001 "*Wealth Creation by Design – Building Innovative Capability*" we created a forum for wide-ranging discussion led by a range of outstanding speakers. The policy suggestions below represent a distillation of views presented there, plus views drawn from the considerable expertise amongst the Institution's membership.

Education, Values and Attitudes

It is well-established that for countries seeking to enter a knowledge society initiatives in education have long-lasting effects. We do not present goals or policy for the education system as a whole, but focus on NZ's ability to build a sufficiently sized wealth-creating sector within a balanced knowledge society.

Goals:

- Change attitudes in the wider community so that our brightest young people and their influencers (parents, extended family, friends, careers advisers) believe that careers in IP creation and realisation are prestigious and rewarding - more will then seek these careers rather than careers supporting "compliance" activities (e.g. financial, legal).
- Lead attitudinal change so that New Zealanders seek to determine their own livelihoods rather than be lifetime employees, are prepared to take responsibility for re-education to upskill themselves, are valuing of knowledge in themselves and others, and seek to be technologically literate, thereby assisting them to cross the so-called "digital divide".
- Develop attitudes so that New Zealand as a society is prepared to be less cautious in our compliance activities, and therefore more supportive of risk-taking innovation.

- Foster attitudes which value those secondary and tertiary curricula that develop and underpin innovation and entrepreneurship as much as the more traditional curricula, whilst developing in students a view balancing the importance of community social and environmental aspirations on one hand with economic growth on the other.
- Ensure that all Government investment leads to world class educational outcomes and that the supply of suitably skilled people (including those through immigration) is aligned with the nations needs.

Policy Initiatives

- Require all parts of the educational sector to move to modern learning outcomes-based approaches through adoption of assessments based entirely on this ethos, thereby supporting a variety of learning environments that foster different learning approaches.
- Recognise the importance of information and communication technology in three ways.
 - Ensure New Zealanders are computer- and Web- and e-commerce-literate at an early age (progressively being achieved) and that they look to harness the benefits of such technology throughout their lives.
 - Establish computer science as a science-based subject in our senior secondary schools as soon as reasonably possible.
 - Expect students to use ICT as a support tool throughout other curricula.
- Introduce internationally-competitive and more specifically-targeted funding of those secondary and tertiary curricula that foster and underpin innovation (e.g. those developing skills in product and process development, knowledge in biotechnology) – in schools this is the technology curriculum, in tertiary education it is technology and engineering and parts of science.
- Correct the under-development of technology, science and mathematics in high schools by teacher professional development and resource material development programmes, as well as paying premiums to attract and retain excellent staff.
- Throughout the school system, develop an ethos of awareness of the roles and interactions of law, finance and business skills in supporting innovation that also meets social and environmental goals (especially through social studies and the “society” strand of technology), but resist the temptation to move more business studies below tertiary level (similarly to how it would be inappropriate to move more than an awareness of engineering into schools).
- In University funding models reward Universities that invest in their areas of competitive advantage (staff, equipment) and penalise those that invest in competitive behaviour (course duplication) and infra-structural support (buildings)
- Redevelop the industry training models and the inter-relationships of industry with ITOs and the Polytechnic sector so that partnerships which are responsive to change and thus meet the need for skilled trades are developed.
- Fund the tertiary sector differentially by discipline and academic level so that in each discipline the provider can pay the market rate for the right staff; at post-graduate level this will mean substantial premiums for internationally-competitive academic staff in key areas for wealth creation.

- Develop improved immigration procedures so that entry to New Zealand of those with vital technological, engineering and innovation skills is linked to recognition by their peers through their professional body, rather than administratively assessed by public servants.

IP Creation and Realisation (Research, Development and Technology Transfer)

Goals:

- Create an environment in which the private sector buys in at early stages to research-led innovations, and shares with Government the responsibility for nurturing them towards commercialisation.
- Create an environment in which technology transfer is fostered by the continuing movement of researchers with their innovations from the research sector to ongoing employment in the private sector supporting their innovation.

Policy Initiatives:

- Abandon the global concept of public good science for market-pull research intended to foster wealth creation (because in many industrial sectors where companies compete for market share they will co-operate as a sector on only research that is not mission-critical).
- Separate Government funding streams so that each stream can be designed to meet the “natural behaviours” of the stakeholders for the types of activities involved, and simplify the many schemes (including HRC, Marsden NERF, TechNZ, Industry NZ, scholarship schemes administered by RSNZ) into a smaller number of categories.
 - Operational research required to develop public policy being the total responsibility of those Ministries concerned,
 - Research required to implement public policy to be funded from the operational budgets of the Ministries or departments concerned and not from Vote: RS&T.
 - A component of Vote:RS&T to be allocated to research on well-being (broadened view of HRC funding), and compliance with social and environmental goals, and this be treated as one fund available to Universities only with relatively long term funding (3-5 years) thereby supporting returning New Zealand scientists.
 - A component of Vote:RS&T to be allocated to blue skies research from which the outcomes are potential “technology-push” products which might be patented and licensed by the research provider, and this be treated as one fund available to Universities only with relatively long term funding (3-5 years) thereby supporting returning New Zealand scientists.
 - A component of Vote:Education be specifically recognised as being for University research to ensure international bench-marking of our research-led degrees, and to provide a backbone of people exiting University with postgraduate research education.
 - A component of Vote:RS&T to be allocated to “market-pull research and development” focussed on new product, process or service development, this money to be

continued overleaf

accessible only on a co-funding basis with the private sector, and that the definition of public good science not be applied to this component.

- A small component of Vote:RS&T to be allocated to cost-reduction research in existing industries on a co-funding basis to ensure that private sector funding for cost-reduction research is effectively levered.
- A component to be allocated to industrial development on a co-funding basis using the TechNZ model, but seeking to unify the myriad of schemes (including seed venture capital and incubators) so that they vary by only the variable ratio of private and public sector funding (see next point).
- All co-funding to work with a variable ratio of private sector:Government investment, this ratio set according to the stage of development of an industry, the stage of development of the research, and the nature of the research (with the ratio varying from 1:10 from sunrise activities towards 10:1 for cost-reduction activities in mature industries); thereby maximising leverage of investment from the private sector.
- Across all Vote:RS&T schemes, support human resource development by providing financial incentives, imposed over the top of any scheme, for the involvement of post-graduate students or post-doctoral fellows in the project work, these applied in an even-handed manner across subject areas in which there are skill shortages, but not in others.
- Allow various forms of clusters and interest groups, and even individual companies, that are not representative of industry sectors access to market-pull funding.
- Foster development of globally competitive, leading edge technology platforms from which a variety of products can be developed, thereby achieving high leverage on investment.
- Set the relative size of the components or streams within Vote:RS&T described above similarly to other small countries succeeding in developing knowledge-based industries, but acknowledging our likely greater reliance on biotechnology-based industries.
- Allow research providers considerable freedom to spin-off their innovations through access to a variety of commercial models as fits the particular innovation.
- Measure outcomes from Government-owned research providers more by technology audit than by business or financial audit i.e. rate them less on their own organisational success and more on the success of their clients.

Alignment with Social and Environmental Goals

The operating environment we have created for business and development reflects our cautious approach. We have subjected our entrepreneurs to both substantial compliance cost and the potential for lengthy delays through the compliance environment we have embodied in legislation.

Goals:

- Reduce our compliance activities (financial, legal, planning) to minimum size, complexity, and duration whilst ensuring that wealth-creating activities will not compromise our social and environmental aspirations and goals.
- Seek attitudinal change in the business boardroom so that their

collective literacy of both innovation and social and environmental compliance issues is better aligned with NZ as a knowledge society.

- Develop a New Zealand attitude that it is necessary to have winners in the wealth creation field for there to be prosperity for all, and that this is socially and morally acceptable.
- Ensure that our procedures and processes allow Maori to participate fully within all activities without disadvantage

Policy Initiatives:

- Review major legislation including the Resource Management Act to obtain a more practical balance between the protection of stakeholders in the wider community and needs of innovative industries.
- Continue review of compliance costs seeking legislative change for their reduction.
- Foster increased technological literacy (competence) amongst the directors of technology-based businesses.
- Adhere to the principle of no special subsidy for either regions or Maori seeking development assistance, but create an environment where regional and tribal groups form meaningful "clusters" which are allowed to access opportunities for R&D and technology transfer assistance in the same way as industry collaboratives, private or publicly owned companies.

Taxation Treatments and Enterprise Transfer

Goals:

- Create an internationally competitive, but unsubsidised environment for the development of innovation-based enterprises within New Zealand, thereby capturing wider benefits for New Zealanders
- Catch-up on knowledge-based developments elsewhere by creating an environment that encourages enterprises to transfer part or all of their wealth-creating activities to New Zealand without compromise to our social and environmental goals

Policy Initiatives:

- Treat research and development expenditure no worse than as operating expenditure (rather than capitalise it) so that the fiscal treatment is consistent with the commercial risk associated with R&D.
- Align company tax rates with international levels so that a decision for a trans-border organisation to locate or remain in New Zealand is at worst tax-neutral, even if the personal rate of taxation on employees is set at a higher rate.