The Role of Government towards Encouraging the Development of Academic Research Commercialisation in New Zealand Universities: A Historical Overview of Policy Directions

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Abstract

Over the past three decades, since the passage of the Bayh-Dole Act of 1980 in USA, many OECD nations have accelerated the development of academic research commercialisation to help drive their nation’s innovation and productivity goals. In New Zealand, the performance of the nation’s innovation system has failed to keep pace with other developed nations raising questions about past government strategies. This study provides a more comprehensive understanding of the historical role of government and the interplay between significant shifts in research direction, funding and accounting that has contributed to the development of academic research commercialisation in NZ universities. The paper concludes that funding pressures combined with government’s lack of early recognition and formal endorsement of research commercialisation as a vital activity has contributed to previous low levels of academic research commercialisation experienced by NZ universities.

Keywords: Academic research, accounting, commercialisation, government, innovation, universities.
Introduction

Universities are often viewed as rich reservoirs of unexploited commercialisable intellectual property with huge potential to stimulate innovation and economic growth (Mowery, Nelson, Sampat, & Ziedonis, 2001; 1994). These views combined with pressures from the institutional environment have put universities at the centre stage of creation and diffusion of new knowledge considered essential in driving the innovation and economic development plans of many nations’ (e.g OECD, 2008; Rasmussen, Moen, & Gulbrandsen, 2006). In US, Congress passed the Bayh-Dole Act in 1980 to ensure USA’s competitiveness in world economy and universities were given a central role in commercialisation of research to help drive the nation’s innovation and productivity. Since then a number of initiatives have been taken in many countries especially in UK (e.g HM Treasury, 2004), across Europe (e.g Commission of the European Communities (COM), 2003), and Canada (AUCC, 2001), to recognise and enhance universities engagement in commercialisation of academic research. Universities are now increasingly expected to take a leading role in fostering commercialisation of research and some countries, for example, Canada had gone even further than most and set an ambitious target to double research by 2010 and triple the rate of commercialisation (AUCC, 2001).

In New Zealand, the performance of the nation’s innovation system has failed to keep pace with other developed nations. The country continues to lag behind in terms of GDP per capita (OECD, 2007) and ranks towards the bottom end of the OECD’s productivity league (OECD, 2009). A recent OECD review of innovation policy in New Zealand noted concerns relating to a fragmented system of government support to R&D and innovation and a lack of coherence across a full range of innovation related policies (OECD, 2007). The NZ government recognises that innovation and university research commercialisation are
essential ingredients to the success of the nation’s economic development plans. However, recent OECD concerns had cast doubts on whether strategies utilised by government over the past three decades had in fact encouraged the development and performance of academic research commercialisation in NZ universities. Despite a broad acceptance by governments around the world of the importance of research commercialisation (Nordfors, Sandred, & Wessner, 2003) and its contribution to nations economic performance (Dahlstrand, 2008; Lindelof & Lofsten, 2003; Lofsten & Lindelof, 2002), there is lack of studies that examine the historical role of government and accounting influences on the development of academic research commercialisation. Acquiring resources and financial incentives are necessary components of research commercialisation development. However, the interplay between significant shifts in research direction and funding and associated links with accounting and accountability mechanisms to facilitate changes is not well understood. In the NZ context, there is lack of clarity over whether universities’ had any clear direction and mandate from the government to engage in commercialisation of research or has research commercialisation emerged as an unintended consequence of funding pressures from past government reform initiatives that had contributed to current levels of research performance.

The aim of this paper is to contribute to a more comprehensive understanding of the role of NZ government and the role of accounting in the development of university research commercialisation. The paper begins by a brief discussion of the concept of commercialisation. The emergence of the commercialisation strategy is then traced through a series of public sector research policy and tertiary education reforms that occurred over the past three decades. Within this, the role of accounting and its influences in the development of research commercialisation is also examined. Reliance was placed on previous literature and archival sources of data including government reviews and policy documents.
Accompanying legislative framework and funding mechanisms were also examined. The paper concludes with an assessment of the role of government and accounting in encouraging and supporting the development of academic research commercialisation in universities. Some suggestions are offered to help guide future policy directions.

The Commercialisation Concept

Research commercialisation has been broadly defined as the means of advancing intellectual property, ideas, know-how and research-based skills in terms of developing marketable new products, services and processes that has useful economic, social, and environmental outcomes (DEST, 2005; Laperche, 2002). Bok (2003) defines research commercialisation in terms of efforts made throughout the university to make profit from research. It includes adoption of revenue generation and profit-seeking strategies through technological innovation and research, and university-business cooperation. Commercialisation relies on the application of the logic of market forces with a reorientation more towards a revenue and profit motive (Bayliss & Kessler, 2006; Bozec, Zeghal, & Boujenoui, 2004; Queensland Treasury, 1994; Williams, 2006). Various studies have highlighted that the move towards commercialisation has been broadly inspired by New Public Management (NPM) initiatives to provide market-oriented solutions to public sector accountability (Bayliss & Kessler, 2006; McKenna, 2000; Queensland Treasury, 1994; Spicer, Emanuel, & Powell, 1996). These studies have also argued that the public sector could become more effective and efficient when run according to market principles. Commercialisation through the application of market forces was seen as providing competition and incentives to achieve accountability, efficiency, and effectiveness in the public sector (Spicer et al., 1996).
We do not intend in this paper to make a distinction between research commercialisation as a process or outcome; rather the focus is more on commercialisation as an overall concept and strategy that has evolved from government reform initiatives over the past three decades.

**Historical Developments**

In New Zealand, the origins of the research commercialisation strategy can be traced back to the more general reforms of the public sector that resulted in the introduction of the ‘user pays’ policy in the Department of Scientific and Industrial Research (DSIR). Under considerable influence of the broader public sector reform programme, government policy took a view that it should not be funding or subsidising research of direct commercial value. The general public sector reforms had also set the precedent for the radical reforms of the tertiary education sector. During the mid 1980s, the NZ government commissioned a series of reports that recommended neo-liberal or market driven approaches to tertiary education reforms. Collectively these reforms demonstrated how the government had progressively adopted a policy of commercialisation and despite initial resistance; the tertiary education sector had accepted large parts of the “commercialistic model” (Easton, 1997). The following sections discuss the three decades of development of the government’s commercialisation strategy. Within these discussions, the role of accounting in influencing changes towards the development of commercialisation is also examined.

**Government Reforms – The Broader Context**

Prior to the early 1980s, the NZ economy was highly regulated, protected, and subsidised. The government strategy was fashioned alongside the traditional Keynesian view of the nation’s collective role in providing for a welfare state. The early 1980s also saw high levels of overseas borrowing by the National Government to pursue major investments in many states owned trading enterprises more commonly known as the ‘Think Big’ projects.
The transformation or reinvention of the public sector began in 1984 with the election of the fourth Labour Government that initiated the most sweeping changes ever undertaken in NZ history (Boston, 1991). The newly elected government promised to liberalise the economy by using competitive market forces and less reliance on government intervention (Easton, 1997). During this period, there were major economic, social and political pressures for change including concerns over high levels of public debt and expenditure. The government’s public sector reform strategies were primarily aimed at improving the effectiveness and efficiency of the public sector, improving accountability, making public services more accessible and responsive, and improving the overall quality of public service provision (Ball, Dale, William, & Sacco, 1999; Boston, 1991, 1991b; Boston, Martin, Pallot, & Walsh, 1991, 1996). Based on the principles and ideas of “economic rationalism” and “neo-liberalism”, the reform marked a revolutionary transformation from a traditional bureaucratic public sector to a new ‘business model’ based on private sector management practices involving more market competition, greater choice and contestability (Butterworth & Butterworth, 1998). This corporate style of management became commonly referred to as “managerialism”, and “New Public Management” (NPM). The NPM advocates the use of private sector management practices with some underlying dominant themes that include comprehensive corporate planning, emphasis on greater autonomy and responsibility, introduction of performance based contracts and remuneration systems, use of competitive tendering and purchase agreements including contracting out services, and devolution of management control and development of new enhanced reporting, monitoring, and accountability mechanisms (Aucoin, 1990; Ball et al., 1999; Barzelay, 2001; Boston et al., 1996; Considine & Marginson, 2001; Deem, 2006; C. Hood, 1991; Painter, 1997; Pallot, 1991). The rationale for the NPM reforms is comprehensively documented in a report entitled Government Management, prepared by Treasury (1987) as a briefing for the incoming Labour
Government. The comprehensive programme of NPM reforms and economic liberalisation policies of the 1984 Labour Government has been extensively recorded and debated in various other publications such as Bollard and Buckle (1992), Boston, et al. (1996), and Norman (2003). It is worth noting that NZ was not alone in its pursuit of reinventing the public sector during this period. Many other OECD countries, such as Australia, Canada, and Britain had also embarked on major public sector reform programmes but according to Boston, few could match the scale or scope of the reorganization undertaken in NZ (Boston, 1991). The broader context of NZ public sector reforms described above had a considerable influence on the state sector research reform which is discussed next.

**Commercialisation of the Department of Scientific and Industrial Research (DSIR)**

The DSIR, established in 1926, was the central authority that co-ordinated and supported the research efforts of government. DSIR and its council co-ordinated and helped fund research efforts in other government departments but in 1935 it began to undertake more research itself. It began a program of expansion and centralisation of science and industrial research and by 1949 it had added eight further research divisions and trebled its staff numbers (see Galbreath, 1998). It received a central funding allocation from government and traditional budgeting was used as the key accounting mechanism to allocate funding to various public research bodies. The budget also served as an important planning and control mechanism. Budget allocations helped determine the research agendas and priorities for the department and other state science agencies it administered. The budgets use as a control mechanism became evident in 1950 when it helped the government rein in DSIR’s spending after it exceeded its budget allocation. But then growth had continued with the expansion of DSIR’s role into research departments undertaking research in competition with other departments. By this time DSIR’s council had lost its usefulness as a central co-ordinating body for research and was abolished in 1963 and replaced by a more independent National
Research Advisory Council (NRAC), administered separately from DSIR (see Galbreath, 1998). From 1963, the NRAC administered the funding allocation and set separate budgets of DSIR and other departments, each with its own priorities. According to Galbreath (1998), in 1970, NRAC proposed a more coherent policy for national science with an overall science budget that allowed for growth in scientific manpower by 5 percent a year. Scientific policy was guided by budget formulation which allowed for overall coherence of national scientific effort and enabled growth. The science budget plan became a successful accounting mechanism and under the budget, DSIR had been growing by 5 percent a year. By 1976 it had expanded to a total of 2,097 staff and 20 research divisions (see Galbreath, 1998). Following the oil shock of 1973, government was forced to curb expenditure and from 1976 DSIR like all other government departments had controls on expenditure including a requirement to charge for services where possible. This in itself became an interesting accounting challenge for the scientists as the characteristics of science and business were very different in terms of motivation, purpose and operating values (Edmeades, 2004).

With the government intent on relying on the logic of market forces and its economic liberalisation policy to transform the nation’s research activity, DSIR came under considerable pressure to become more commercial. In 1984, the Labour government imposed expenditure controls and introduced a ‘user pays’ policy in DSIR not only as a cost recovery measure but also to encourage customer- contractor approach (see Galbreath, 1998). Government policy took a firm view that it should not be funding or subsidising research of direct commercial value. It also took the hard line approach of cutting funding of DSIR and other research agencies by the amount it considered users should be paying. According to Galbreath, from 1984-1988, government funding to DSIR was progressively reduced by a total of 25 per cent which led to DSIR more actively seeking customers willing to contract for
its services. The commercial model based on user pay policy presented its own accounting challenges in terms of adopting appropriate costing and pricing models. The role of accounting had now expanded to include an understanding of full cost recovery models and pricing policies. It required identification of the direct and indirect costs involved in undertaking research and research pricing. The criteria for categorising indirect and overhead costs associated with research and research pricing had to be determined and then certain indirect costs had to be attributed to the total cost of research in a systematic manner. The introduction of user pays policy marked the advent of NPM reforms with the introduction of competition, separation of funders from providers, contestability of research funding, and allowing the logic of markets forces to determine where research and development would yield highest commercial returns using the accounting criteria of costing and pricing.

The Research Commercialisation Debate

As recorded by Galbreath (1998), the move to commercialisation of research was subject to considerable political debate that led to the formation of various working parties to advice government. Treasury, in support of research commercialisation had put forward an economic argument that insisted on letting the markets decide where research and development were likely to yield the highest returns. They considered the user pays principle was the appropriate means. DSIR scientists on the other hand argued for government research funding for the good of the nation and its economic development priorities. However, Treasury economists insisted that better economic performance would result from a more competitive economic environment by separating funders and providers, and introducing contestability in funding allocations with an emphasis on purchasing outputs rather than funding inputs. To scientists, the economic arguments of Treasury did not measure up and in an effort to convince Treasury officials of the value of research, the
scientists even had relied on accounting measures of internal rate of return on a number of research projects to determine its value to the economy. According to Galbreath, the scientists took a conservative approach by charging the costs of the entire DSIR division where the project was carried and they estimated the benefits to be 20 percent annual return on investment. Throughout the 1980s, this was the accepted accounting measure but while debate continued over funding issues, gradually the commercial market model became accepted by most scientists. As recorded by Devine (2003, p. 70), ‘the science community had itself failed to grasp the significance of the reforms’ and some supported it for ‘opportunistic reasons rather than conviction.’ By this time the ‘market failure’ argument had also emerged as a rationale for government to deliver funding for basic research in the long-term interest of research development or where research had social value but was not marketable. In 1988, the idea that research should be funded for the ‘public good’ was recommended by the Science and Technology Advisory Committee (STAC), the last of a succession of official working parties to recommend on the restructuring of science. STAC supported a wider approach to research funding and recommended restructuring of science along market lines advocated by Treasury economists. It also recommended funding of public good and pre-commercial research that has potential for future economic benefits as well as funding research for strategic reasons to support retention of research skills in NZ (see Galbreath, 1998). This led to the restructuring of science and in 1989, a new Ministry of Research, Science and Technology (MoRST) was established to provide policy advice to government. In 1991, the Foundation for Research, Science and Technology (FRST) was established as an independent funding agency to allocate government funding for research from Public Good Science Fund.
Establishment of Crown Research Institutes (CRIs)

In 1992, DSIR and other government science providers were restructured into ten Crown Research Institutes (CRIs) to operate more as commercial entities established under the Crown Institutes Act 1992. The Crown Institutes Act 1992 also abolished the DSIR and other science providers. The underlying benefits from this restructuring were identified as provision of a clearer framework for management of all risks, devolution of operational management decision-making, wider access to capital, and enhanced management accountability. The primary intention was to encourage efficiency through competition and clear objectives and robust accountabilities with greater transparency and focus (Devine, 2003; Edmeades, 2004). The CRIs are subject to the Crown Entities Act 2004, the Crown Research Institutes Act 1992 (CRI Act) and the Companies Act 1993. They are registered as companies, have board of directors appointed by government, and manage their own resources. With each CRI set up according to its commercial purpose under the guidance of boards modelled on the private sector, it was expected that the commercial criteria would provide a fair assessment of managerial performance. However, the primary objective of setting CRIs as separate companies was to ensure the transformation of many of the commercial activities to profit-making and creating positive shareholder value. This perhaps explains why the tenth CRI responsible for social research was subsequently disbanded in August 1995 due to its failure to establish commercial viability (COMU, 2010). The transformation of CRIs as commercial entities was greatly assisted by the introduction of ‘business accounting’ methods. This was facilitated by the CRI Act which required CRIs to generate, on the basis of generally accepted accounting principles, an adequate rate of return on shareholders’ funds (equity) which reflects the cost of that equity. According to Crown Ownership Monitoring Unit (COMU), CRIs have become much more market focused, exhibit a much stronger and more pervasive strategic focus, and have greater performance
expectations than the departments from which they were formed. \[iii\] They have become much stronger organisations now than at the time of their establishment. They employed in excess of 4,200 staff and in terms of financial performance, CRIs reported a collective operating surplus of $25.2 million in the year ended June 2009. Total operating income increased by $28.8 million to $677.9 million. Total assets were valued at $701.9 million at 30 June 2009 (up from $668.7 million at 30 June 2008). \[iv\] It is interesting to note that such measurements are typical performance measurements of a commercially focused business organisation and the role of accounting has expanded to meet these financial accounting requirements. The reforms of the DSIR and changes in wider research policy had set the context for reforms in the tertiary education sector.

**Period 1980-1989: Setting the Reform Agenda of the Tertiary Sector**

Prior to the early 1980s, under the traditional Keynesian model, education was considered a ‘public good’ that was freely available to all citizens. Education including all research was block grant funded by government. It was considered as an important investment by government in building the wealth generating capacity of the nation as well as making a worthy contribution towards the greater good of society. The Hawke Report on Post-Compulsory Education and Training (PCET) in New Zealand published in July 1988 became a significant starting point of debate in the commercialisation process of tertiary education (Hawke, 1988). The report recommended that universities become more commercial with the ability to generate private funds and set its own fees. It also recommended the separation of teaching and research, and use of contractual forms of accountability through charters and performance appraisal systems. Most of the Hawke Report recommendations were incorporated as governments intended policies in the *Learning for Life* document released in February 1989 (Ministry of Education, 1989b). The detailed
recommendations on the implementation of these policies were contained in the Learning for Life Two document (Ministry of Education, 1989a). These two documents provided the initial onslaught of neo-liberal market policies that substantially changed the tertiary education system in New Zealand. The Hawke Report and the Learning for Life reports maintained a similar commercial approach using free market forces to drive the tertiary education sector. The Learning for Life reforms resulted in some degree of corporatisation whereby TEIs operated like private businesses, utilising the private-sector management practices (Olssen, 2002). However, while the period 1984 – 1989 was that of experimentation with the state withdrawing from many areas of economic production in the general public sector, education continued to be understood as a social good rather than economic investment (Larner & Le Heron, 2005).

First University Commercialisation Office Established

A significant development in university research commercialisation was in 1988. The University of Auckland established UniServices, the first university commercialisation company in NZ to handle all commercial research contracts and consultancy work coming out of the university. It has been argued that public research funding levels for the tertiary sector was far too little in comparison to international standards so in a partial response to this problem, UniServices was formed to generate funding for the University to help build its research capacity (J. Hood, 2001). This important development signalled the introduction of research commercialisation in the NZ tertiary education sector. Within three years since the formation of UniServices, all other universities had established varying forms of contract research units and companies to facilitate the development of their research commercialisation opportunities. UniServices was set up as a limited liability subsidiary company with an independent board equally split between business and academic members. The commercial nature of its operations meant that it had to effectively decouple from the university accounting systems and procedures and adopt business accounting approaches and financial management practices to ensure that it was run as a profitable business operation. Its success reported in the 2009 annual report of the University of Auckland was that the annual revenue grew by 17.4 percent to $114 million for 2009 and currently it provides employment
for 750 staff and researchers, and sponsor research for an additional 550 University researchers. There were 200 active patent families and 83 new invention disclosures in 2009. In 2008, the NZ Vice Chancellors Committee (NZVCC) reported that universities are at the forefront of commercializing research results. All universities have established their commercialisation operations and now the sector is thriving with a turnover of $350 million a year. In the four years 2003-2006, their combined activities had a total income of $1.2 billion dollars.

**Period 1990-1999: The Influence of Neo-liberalism**

In addition to the institutional and funding pressures that led to the establishment of university commercialisation structures, the influence of neo-liberalism was a significant driver of commercialisation. The commercialisation strategy in the NZ tertiary education sector can be traced to a series of government reports that recommended neo-liberal or market driven approaches to tertiary education reforms. Under neo-liberalism, education was reconstituted as an essential service or product to be traded in the marketplace (Davies, Gottsche, & Bansel, 2006; Peters, 1999). Neo-liberalism used strategies based on market principles of economic efficiency and effectiveness, accountability, transparency, autonomy, contestability, choice and market competition. These strategies largely influenced the development of education policy decisions in the Learning for Life Two document. The Learning for Life Two document had also set the policy agenda for exposing TEIs to commercialization using market forces.

In 1990, the Learning for Life Two document was implemented. The 1990 Education Amendment Act provided the legislative framework for TEIs to operate as autonomous and economically efficient “businesses” with the introduction of bulk grants for teaching and research. Each tertiary education institution (TEI) was granted institutional autonomy with their own governing council that operated on a contractual model of accountability through charters, mission statements and performance objectives. To give effect to this new
accountability and performance reporting requirements, major public sector accounting
changes were implemented within the legislative framework of the Public Finance Act 1989.
TEIs financial statements were remodelled in terms of statements of objectives and
statements of service performance and annual reports became the key accountability
document used to report to government and other stakeholders on performance. Changes to
the funding system were made with a mix of student fees and government loans as well as a
separation of teaching and research with some research funding becoming more contestable.
TEIs were encouraged to become more commercial with the freedom to generate private
sources of revenue and set their own fees to supplement simultaneous reduction in bulk
grants (Easton, 1997; Olssen, 2002). These required significant accounting changes to be
implemented within TEIs such as course costing and pricing, programme budgeting and
enhanced financial reporting systems. The role of accounting had expanded to include an
understanding of full cost recovery models and pricing policies. It required identification of
the direct and indirect costs involved in undertaking research and pricing of research projects.
The criteria for categorising indirect and overhead costs associated with research and research
pricing had to be determined. The nature of all costs had to be properly identified and
recorded in the general ledgers, and then certain indirect costs had to be attributed to the total
cost of research and individual research projects to ensure pricing was done in a systematic
manner. Greater reliance on accounting and pricing methods probably helps explain the
substantial increase in research funding from universities own sources. University generated
research funds including the student fee component more than doubled from $46.8 million in
to the research sector with the establishment of MoRST and FRST had also propelled fiscal
conservatism on the part of the government to change the set of incentives that faced research
funders and providers in order to bring about greater accountability, efficiency and private

By early 1990s, increasing student numbers brought increasing funding pressures on government. This prompted the National Government to establish the Todd committee to advice on the options for public and private funding. The Todd Report published in 1994 reaffirmed the “commercial logic” and neo-liberal strategy adopted by the government to manage public TEIs (Easton, 1997). Throughout the 1990s, a series of reports had also emphasised market driven approaches to improving efficiency and accountability of the TEI sector. This clearly reflected the overall trend of the government’s major macro policies and the socio-economic reform agenda in which economic rationalism and market liberalization were the key features. The shift towards market driven entrepreneurship was a common trend in tertiary education in most OECD countries (Etzkowitz, Webster, Gebhardt, & Terra, 2000; Marginson & Considine, 2000; OECD, 2003; Vincent-Lancrin, 2006).

Neo-liberalism had redefined the very purpose of education and research within the concept of market, product and business. It had a major influence on policy development leading to the ultimate commercialisation of education in most western countries. Commercialisation of education using market based principles have been referred as “academic capitalism” (Slaughter & Leslie, 1997) and universities driven by a commercial and entrepreneurial spirit became commonly known as the “Enterprise University” (Considine & Marginson, 2001). According to Codd (2005, p. 194), “successive New Zealand
governments embraced neo-liberalism as allegedly the only solution to worsening economic conditions”. The extension of marketization and massification accompanied by the neo-liberal reform process saw a “variant of the commercialization” of the public sector introduced to the NZ tertiary education (Larner & Le Heron, 2005).

Beginning in the late 1990s the perceived failings of the neo-liberal strategy started to emerge and the new Labour-Alliance coalition government was elected in November 1999. The new government set out to change the direction of tertiary education. It appointed the Tertiary Education Advisory Commission (TEAC) to set a vision for tertiary education that would to pave the way for New Zealand to become a "world-leading knowledge society" (TEAC, 2000, p. 32). This marked a decade of new beginnings for research and innovation.

**Period 2000-2009: Emphasis on Innovation and Nation Building**

TEAC in its second report, Shaping the System, suggested that neo-liberal policies were incompatible with the key contextual factors such as the need to develop a knowledge society, changing technology, and the effects of globalisation impacting on the tertiary education system (TEAC, 2001b). This report was immediately followed by the third TEAC report, Shaping the Strategy, released in July 2001, which emphasised that tertiary policy in NZ must be aligned with important national strategic goals of innovation, and economic and social development (TEAC, 2001a). By this stage the government had recognised the growing importance of innovation to economic growth and put innovation at the centre of its economic policy in 2000. “Prior to 2000, NZ government did not have a strong focus on innovation as part of its economic policy approach, although specific policy instruments in the Research, Science and Technology portfolio funded R&D to improve international competitiveness and lift firms’ technological capabilities. During the 1990’s, the prevailing view was that getting foundational policies right was generally sufficient for achieving
competitive markets, dynamic efficiency and good innovation and growth outcomes.”

(OECD, 2007, p. 156)

In 2000, the government appointed the Science and Innovation Advisory Council (SIAC) to comprehensively assess and advice on the NZ innovation system. Since 2000, the NZ government had also set the focus of the tertiary education system to produce knowledge, skills and innovation that will transform the economy, promote social and cultural development, and contribute effectively to its development as a knowledge nation (TEAC, 2001a, p. 1). Following various reviews and reports on innovation, the government in February 2002 set out its approach to economic development in the document entitled Growing an Innovative New Zealand commonly referred as the Growth and Innovation Framework (GIF) (New Zealand Government, 2002). GIF had a major focus on returning NZ’s per capita income to the top half of the OECD rankings by growing innovation. The government established the Growth and Innovation Advisory Board (GIAB) in May 2002 to provide it with high level, independent strategic advice on growth and innovation issues. GIAB grew out of SIAC with members comprising of senior people in business and related walks of life who were leaders in their respective fields and who had the ability to take a strategic "NZ Inc" perspective on New Zealand's economic development (New Zealand Government, 2002). Among other issues, the advice to government was to recognize the importance of tertiary education research and commercialization as key drivers of modern economies and thriving societies.

Establishment of the Tertiary Education Commission (TEC)

In 2003, the government established the Tertiary Education Commission (TEC) to help provide strategic direction and formulate research priorities for TEIs. To give effect to the government’s vision on research and innovation, TEC released the first Tertiary
Education Strategy (TES) 2002-2007 that contained a key strategy (strategy six) to strengthen research, knowledge creation and uptake for the NZ knowledge society (Ministry of Education, 2003). Specific objectives relating to this strategy were to encourage and reward excellent research performance (objective 29); have stronger accountability and enhanced performance reporting for tertiary education research (objective 30); have a more focused tertiary research investment through world-class clusters and networks of specialization (objective 32); ensure greater alignment of tertiary education research with national goals (objective 33); and improve knowledge uptake through stronger links with those that apply new knowledge or commercialization of knowledge products (objective 34). Within this strategic framework, the Statement of Tertiary Education Priorities (STEP) was formulated and released by the Minister of Education to give effect to these strategies. Since 2002 a significant round of reforms began with the enactment of the Tertiary Education (Reform) Bill and the launch of the 2002-2007 Tertiary Education Strategy (TES). The reforms were aimed at “shifting the attitudes, culture and focus” of the tertiary education sector to greater collaboration and rationalisation; more responsiveness to the needs of the communities it serves; and ensuring that there is greater alignment with the nation’s economic and social development goals (Ministry of Education, 2006a, p. 29). The government had also recognised that it needed to promote the “partnering” ethos with an emphasis on collaboration and university-industry-government relationship that was important for the knowledge economy, nation building, and promoting “social cohesion” and international competitiveness in a global economy. This partnership is more commonly referred to as the triple-helix of research commercialisation (Etzkowitz & Leydesdorff, 1997; Etzkowitz & Leydesdorff, 2000).
**Performance-Based Research Fund (PBRF)**

With the government’s awakening to the fact that the tertiary education sector was a major player in NZ’s research and innovation system alongside industry, it established the Performance-Based Research Fund (PBRF) Working Group in July 2002. The Working Group’s brief was to advice on the detailed design and implementation arrangements of PBRF to reveal and reward researcher excellence and excellent research in TEIs. The PBRF Working Group released its report ‘Investing in Excellence’ in December 2002 (Ministry of Education, 2002). This report had set the major strategic direction for research in tertiary education. The government accepted and implemented the report immediately. From 2004, the tertiary research funding system was revolutionised with the introduction of PBRF that placed greater emphasis on research quality as a means of funding research in TEIs. In the PBRF funding formula, 60 percent research funding is based on research quality, 25 percent is based on research degree completions, and 15 per cent is based on external research income generated. Funding allocations for universities through the PBRF commenced in 2004 with $16.3 million rising to $201.1 million when it was fully implemented in 2007.\(^\text{vi}\)

During the phase in period until 2007, bulk of research funding continued on the basis of student enrolments. Between 2002 and 2008 total university research income rose by 102 percent from $297 million to $600.6 million. Total research contracts income rose by 90.3 percent from $194.2 million in 2002 to $369.5 million in 2008. The PBRF Working Group reported that it had expected that “the PBRF will make a major contribution to the development of ‘our knowledge society’ and ‘a prosperous and confident nation’”(Ministry of Education, 2002, p. 4).

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Role of Government

In March 2006 Cabinet agreed on an Economic Transformation Agenda (ETA)\textsuperscript{vii} to build on the directions set by the GIF for lifting New Zealand's innovation and economic performance and improving income per capita. The government had also intended to continue to develop its Tertiary Education Strategy (TES) and a number of sector based strategies in which science and innovation feed into the GIF/ETA. Government’s goals for tertiary education as part of the Economic Transformation Agenda (ETA) were to create and apply knowledge to drive innovation, improving transfer and application of knowledge, supply research and knowledge to create commercial opportunities for NZ firms, connect effectively with businesses to realize these opportunities, and build global awareness and lift productivity and innovation (Ministry of Education, 2006b).

In New Zealand, the government is a significant player in the nation’s research, science and technology system. It finances about half of the country’s investment in research, science and technology, owns research infrastructure, notably CRIs and is committed to supporting innovation and commercialisation of research activities (MoRST, 2006). According to a recent \textit{OECD Thematic Review of Tertiary Education}, investment in R&D is an important indicator of the effort government is putting into achieving scientific and technological progress (OECD, 2008). The reports highlights that in GDP terms, tertiary education R&D expenditure had risen steadily from 0.36\% to 0.40\% across the OECD nations between the period 2000 and 2005, although in NZ’s case, it had declined\textsuperscript{viii}. The NZ government financed R&D expenditure is also much lower than the OECD average and government had recognised this fact by agreeing to lift its public investment to the OECD average by 2010 (MoRST, 2006). The wider concerns that previous government policy settings had failed to encourage innovative businesses was recently raised at the Prime
Minister’s Science Advisory Committee workshop on ‘Improving translation of publicly funded research for economic benefit’ (Gluckman, 2009). The workshop also noted that historically low investments in both public and private Research, Science & Technology (RS&T) over many decades appears to have resulted in lack of knowledge intensive industry in NZ. As such, there were renewed calls for government to fulfil its leadership role in the nation’s science, technology and innovation system.

The NZ government also has a major role to provide the policy frameworks for economic growth and innovation. Since 2000 it has established various science and innovation related frameworks and advisory boards (e.g. SIAC, GIF, GIAB, ETA) aimed at strengthening the innovative efforts of the nation. The government sees commercialisation of intellectual property (IP) from public research as an important way to create benefits for New Zealand and has issued guidelines on IP ownership and use including guidelines on licensing. Three key ministries, the Ministry for Research, Science and Technology (MoRST), the Ministry for Economic Development (MED), and the Ministry of Education have a pivotal role with significant influence on setting research directions and policy and funding administration. A number of other government policy agencies also have important roles such as the Ministry of Health is involved in formulating health research policy and the Tertiary Education Commission (TEC) has a strategic role in the development of tertiary education policy.

Government funding for research in the tertiary education sector is mainly obtained from TEC that provides the Performance-based Research Fund (PBRF). The Royal Society of New Zealand provides basic research funding to TEIs primarily through the Marsden Fund, the Health Research Council provides funding for medical research and FRST provides funding to TEIs for strategic research. MoRST funds FRST, the Royal Society as well as the Health
Research Council. FRST is a statutory authority with an independent board reporting to the Miniser of Research, Science and Technology. It is contracted by MoRST to manage bulk of its actual funding of research and innovation projects. The Royal Society is an independent national academy of sciences, and the Health Research Council reports to the Minister of Health and co-ordinates health research. The NZ government has also established various programmes and support mechanisms and provides funding for these research initiatives. Some examples of funding and support initiatives include the seven Centres of Research Excellence (CoREs) established in 2002-03 by the government to assist the tertiary education sector to reward research excellence and enable development of critical mass of inter-institutional and world-class research networks aligned with the national goals to help improve knowledge uptake and commercialisation of research. Each CoRE is hosted by a university and comprises a number of partner organisations including TEIs. Partnerships for Excellence (PfX) and Techlinks Fund are innovation related TEC initiatives to improve links between TEIs, industry and business organisations to help develop research capability, transfer knowledge and expertise to industry, and encourage private sector investment. The government also established the New Zealand Venture Investment Fund Ltd (NZVIF) in 2002 to address shortage of venture capital to help facilitate commercialisation of innovation and the Pre Seed Accelerator Fund was established in 2003 to help transform research results from publicly funded R&D into viable commercialisation prospects.

Although the government’s role has been recognised through the establishment of various support programmes and funding mechanisms, there is also to some extent a lack of clarity between the roles of government ministries and between those of their funding agencies (OECD, 2007). However, Science for New Zealand, a MoRST document (MoRST, 2006) provides the overarching vision and national policy towards science, technology and
innovation. The second Tertiary Education Strategy document (TES) 2008-2012 highlights concerns that although TEI produces significant amount of research, there is a low rate of transfer to business (Ministry of Education, 2006b, p. 38). The OECD 2005 Annual Review of NZ report also highlights the strikingly low rate of collaboration and ideas flowing from universities and research institutions to businesses (OECD, 2005). Government therefore acknowledges that it is essential to improve the transfer of TEI knowledge to enhance economic opportunities and create wealth for the nation. As such, the TES document 2008-2012 contains the key strategies for TEIs to continue to support the governments overall vision of innovation and commercialization.

**The Role of Accounting**

In the periods 2000-2009, major changes to government policy and research funding of TEIs mainly through the implementation of PBRF had placed greater emphasis on accountability for research performance. Access to funding for research had become much more competitive than in the past, and increasing proportions of available funds provided by government agencies for research were directed for specific purposes. As research & development were significant spending categories in government budgets, TEIs were subject to greater public scrutiny due to concerns of public accountability. The allocation of public research funding for TEIs was increasingly characterised by research priority areas and outcomes, competitive bidding, and performance-based funding. The role of accounting had expanded to incorporate measures of research performance and reporting of results. Issues of costing and charging of research had remained a high priority on the agendas of TEIs. Institutional systems and procedures were more geared towards accounting for research income and expenditure at individual school and project level in addition to research budgeting, costing, and contract pricing. A key performance measure on which universities
reported was external research income generated and this seemed important since 15 percent of PBRF funding is based on external research income.\textsuperscript{x} TEIs as autonomous institutions had the freedom to pursue self determined institutional objectives but at the same time, as public funded institutions, they came under increasing public pressure to utilise the outcomes of their research for the benefit of the society. With growing accountability demands, emphasis was placed on what was produced, observed, and measured. According to OECD, the tension between the pursuit of self-determined institutional objectives and the broader research commercialisation objectives of the nation needs to be recognised and reconciled with an increasing focus on accountability and performance (OECD, 2008, p. 15).

**Discussion and Conclusion**

This study examined the strategies utilised by NZ government over the past three decades to encourage the development of academic research commercialisation in universities. The period 1980-1989 was a decade marked by the institutional transformation of DSIR, NZ’s largest state research organisation, to a new ‘commercial model’ based on user pays policy. The government policy took a view that it should not be funding or subsidising research of direct commercial value. Research policy was guided by budget formulation used successfully as the key accounting mechanism. Budget was used for research planning, allocating research funds and maintaining overall coherence of the national research priorities and effort. With the introduction of user pays policy for research, the role of accounting expanded to include costing and pricing models. In the tertiary education sector, the Hawke Report published in July 1988 was the significant starting point in the debate in the commercialisation process. The report recommended that universities become more commercial with the ability to generate private funds. Interestingly, 1988 saw the first university commercial company established in NZ to pursue the commercialisation
agenda. Despite these experimentations, government was not involved in any developments in commercialisation of academic research during this period.

The period 1990-1999 saw the full impact of neo-liberal polices based on market principles implemented by government in the tertiary education sector. This was a period of intense competition as TEIs had the freedom to generate private sources of revenue. Significant accounting changes were implemented within TEIs such as course costing and pricing models, programme budgeting and enhanced financial reporting systems. The role of accounting had expanded to include an understanding of full cost recovery models, and identification of the direct and indirect costs involved in undertaking research and pricing of research projects. Major public sector accounting changes were implemented and financial statements were remodelled in terms of statements of objectives and statements of service performance. Annual reports became the key accountability document used to report to government and other stakeholders on research performance. The shift towards market driven entrepreneurship was a common trend. Tertiary institutions were strategically positioning themselves, restructuring, and establishing new organisational forms to take full advantage of the commercial opportunities presented by the market. Although teaching and research was separated with research funding becoming more contestable, government failed to formulate strategies to encourage the development of commercialisation of academic research. This is despite the fact that universities across NZ had recognised that commercialisation and innovation activities were important and had started to develop their commercial company structures. It was not until the end of 1999 that the full impact of the failings of government’s neo-liberal strategy was realised.

In 2000 the government had put innovation at the centre of its economic policy and appointed various advisory boards to advice on the development of the NZ innovation
system. This is perhaps the first time the government had stated its vision for NZ to become a world-leading knowledge society with tertiary education recognised as making an important contribution to innovation and development of a knowledge nation. The Tertiary Education Strategy 2002-2007 document clearly laid out the government strategy on academic research and recognised research commercialisation as an important function. The government also established some specific funding and support mechanisms to encourage commercialisation of academic research. The role of accounting had expanded to incorporate measures of research performance and reporting of results. To encourage greater collaboration with industry, government also established CoREs. Although the PBRF rewards research excellence, it has failed to recognise and reward commercialisation of academic research in the PBRF ratings. Career minded academics see this as a disincentive to engage in research commercialisation activities.

From the review of the past three decades of developments, it appears that academic research commercialisation has emerged as an unintended consequence of funding pressures from past government reforms. There has been a lack of national strategy on innovation and commercialisation and previous government policies have been deficient in encouraging academic research commercialisation in NZ universities. It was not until 2002 that government formally endorsed academic research commercialisation as a vital activity and put it on its policy agenda. It seems that after the NPM reforms of the 1990’s, the incoming Labour government had directed funds away from the market place and the needs of NZ industry and enterprises which has largely contributed to the nation’s poor OECD rankings. Even under current government policy, it is still not mandatory for universities in NZ to engage in research commercialisation activities as there is no government funding available to encourage such development. Neither can universities utilise basic research funding for
commercialisation purposes. The only exception is that from 2002, some targeted funding had been made available on a contestable basis for specific research commercialisation projects already in its development stage. This perhaps explains previous low levels of commercialisation of academic research experienced by NZ universities.

The NZ government, as a major funding provider for research is in an ideal position to encourage the development of commercialisation of research in universities. To help realise its national innovation goals, the government must take a leading and proactive role to encourage commercialisation initiatives in NZ universities. With the growing importance placed on universities world-wide to engage in commercialisation of research, the NZ government also needs to develop long-term policies with clear strategies and incentives to ensure that the nation does not lag behind other OECD countries. Future targeted government research grants could be established and conditioned on universities demonstrating that they are able to advance their research and innovations into the commercial market.
**EndNotes**


ii Refer to COMU website http://www.comu.govt.nz/crown-research-institutes.html

iii Refer to COMU website: http://www.comu.govt.nz/crown-research-institutes.html


v Refer http://www.nzvcc.ac.nz/files/u2/NZVCC_Uni_ResearchFIN_1C59D.pdf

vi http://www.educationcounts.govt.nz/statistics/tertiary_education/research


viii Statistics New Zealand (2009) provides the latest R&D funding figures.

ix See http://www.morst.govt.nz/publications/govt-policy-statements/public-service-research-ip-guidelines/

x This has been determined from a review of annual reports of universities.
References


