

Māori Technological Capacity I: A Socio-Economic Opportunity

G. Raumati Hook

Abstract: The economic future for this country is heavily invested in innovation and technology. The government has developed policies that are propelling this country towards a high-tech knowledge economy. Māori, as a collective, need to be part of this future because it holds a promise for socio-economic uplift. In order to understand what is needed from a resource management perspective, Māori must first examine what it is they have in terms of human, social, and technological capital. They then need to define where it is they wish to go, and then devise strategies for achieving that future. This paper is about defining and exploring Māori technological capacity, examining how it relates to Māori people, and considering how they can increase their share of the economic benefits.

Keywords: Human capital, indigenous assets, knowledge assets, Māori social capital, nation building, technological capacity, technological capital, resource management.

Introduction

This country is currently undergoing economic transformation. According to the Ministry of Economic Development, “The Economic Transformation Agenda seeks to progress New Zealand to a high income, knowledge-based market economy, which is both innovative and creative, and provides a unique quality of life to all New Zealanders.” (Ministry of Economic Development, 2007).

Māori have already begun to take their place at this table, but in order to secure and indeed enhance their presence, examination of the current situation in terms of technological capacity will be needed. Enhancement of technological capacity through education may be the best long term investment that Māori can make to ensure their participation. As the Prime Minister of New Zealand recently said:

Education is at the heart of a sustainable knowledge-based society and economy. It must support young people to develop knowledge and understanding; to create, seek and use knowledge; to understand their own learning process, and to work with others to achieve educational goals. (Clark, 2007).

As New Zealand society changes and the development of an innovative society advances, Māori must not be left behind. This move towards high-end productivity and a knowledge economy could be the doorway to a prosperous future for Māori. While New Zealand society as a whole will benefit from the knowledge economy, there are no guarantees that Māori as an ethnic minority will share in those benefits. Some degree of protection may be afforded by government policies, but for the maintenance of rangatiratanga (self-determination), Māori will need to embrace their future and prepare themselves accordingly. Preparation will require an assessment of Māori technological capacity and identification of the various factors that contribute. Māori must be analytical and realistic about where they are currently, identify what they must achieve, and develop the strategies for achieving that future.

This paper is a preliminary look at Māori technological capacity and the various societal relationships that might influence that capacity. The model offered, is a first attempt to understand the dynamic relationships that exist between the socio-economic capacity of an

ethnic minority and the dominant culture. While it is recognized that Māori is not a single entity but a collective of individuals with wide ranging opinions, capacity, knowledge and desires, in this paper they have been considered as a whole in the same way as the government considers the country as a whole when it speaks about an economic future.

Technological Capacity

The government-wide commitment to economic transformation is aimed towards the creation of a knowledge-based society. Exactly what this entails is obscure but multidimensional; however, for socio-economic transformation to be rendered achievable, a realistic assessment of the nation's technological capacity will be required. Technology, for the purpose of this discussion, refers to all scientifically-based manufacturing, research, development, planning, and service organizations and includes all scientific, engineering, and medical disciplines. The key term is "scientifically-based". The technological capacity (TC) of a nation is defined as the sum of the human capital (HC) plus social capital (SC) plus physical assets (PA) plus knowledge assets (KA), i.e.,

$$TC = HC + SC + PA + KA \dots \dots \dots (1)$$

This model is offered only as a reasonable first approximation to the complex problem of trying to understand the nature of the socio-economic relationships between an indigenous minority and their Eurocentric colonizers. The veracity of this unique model has not been established, and is offered here only for the sake of discussion and consideration.

It follows from equation (1) that the total technological capacity in a society would then be the sum of the technological capacities of all firms engaged in high-tech manufacturing, development, research, services, and related activities: i.e.,

$$TC = \sum TC_n = \sum [HC_n + SC_n + PA_n + KA_n] \dots \dots \dots (2)$$

Human capital (HC) in this context simply relates to the number of working-age people trained in technology at a sufficiently advanced level as to be engaged, contributing, and or leading technology development. Measurement of human capital may be quite difficult because of the complex relationships that exist between innovation, creativity, productivity, and the people so employed.

Social capital (SC) is even more difficult to define, consisting as it does of so many subjective components. Social capital speaks to the capital resource that arises from the net-working of technology workers, the principles by which they do business and the manner in which they treat each other, communicate with each other, and collaborate with each other in order to achieve common purpose. Social capital makes use of so-called "circles of trust" wherein the "radius of trust" is dependent upon with whom you are dealing, their relationship to you and your particular group (Fukuyama, 2001). A modern society can be thought of as a series of concentric and overlapping radii of trust. Social capital is difficult to measure although the basic principles upon which social capital is based are totally in alignment with Māori culture and basic principles of manaakitanga (hospitality that arises from respect for another's mana), aroha (partially, love with strong elements of compassion), and utu (reciprocity, and balance) (see, for example, Hook, Waaka, & Raumati, 2007).

All tools, buildings, and power-generating facilities engaged in technology manufacture, be it high-tech computerized robot manipulators or just basic tools are part of the physical assets (PA) of a nation. Physical assets can be measured and quantified.

Knowledge assets (KA) are important because they are those aspects of an industry, firm, nation, or people that contributes to its/their competitive advantage. Knowledge assets have been equated with technological capital (Vanhaverbeke, Duysters & Beerkens, (2001), but for a nation or a people as a whole, knowledge assets alone is too limiting because it does not reflect the intangibles such as the capacity of the people to have, control, or contribute to a knowledge economy.

While people are the single most important asset of a nation, knowledge runs a close second (Conner & Prahalad, 1996). Without people there is no nation and without knowledge there can be no prosperity. The development of knowledge assets can be very expensive, but it is recognized in the business world that the greater the technological capabilities of a firm the higher is its rate of innovation (Fukuyama, 2001). One assumes that the same principles apply to nations. The importance of knowledge assets is accepted within government and hopefully the Vision Mātauranga policies of government (Ministry of Research Science & Technology, 2006) will allow Māori through this door to the acquisition and building of intellectual property. Vision Mātauranga is an invitation for Māori to come forward, an invitation to the knowledge future.

The technical capacity of the Māori people (TC_m) is then as follows:

$$TC_m = HC_m + SC_m + PA_m + KA_m \dots \dots \dots (3)$$

For Māori to improve their position regarding TC_m , any or all of its four component factors can be increased. Simplistically, HC_m can be increased by encouraging student development in the sciences. SC_m can be increased, for example, by maximizing cooperative behaviours within and between Māori groups be they iwi level or simply whānau. Physical and knowledge assets can be increased but with difficulty for Māori who have few assets. Perhaps treaty settlements might find enhanced value by investment in the high-end industries.

SC is the social capital of the nation and this is, in fact, the SC of both Māori and Pākehā engaged in technological activities, i.e.,

$$SC = SC_m + SC_p \dots \dots \dots (4)$$

where SC_p represents the social capital of Pākehā. SC_m and SC_p are not clearly separable because networking and relationships do not exist in isolation. However, SC_m may be increased by increasing those relationships and networks that exist between both peoples. In addition,

$$TC_p \gg \gg TC_m \dots \dots \dots (5)$$

and, therefore, TC_m is very much influenced by TC_p .

The model described above is a first attempt to understand the dynamic relationships that exist between the Māori ethnic minority and the dominant colonizing technological culture that forms this nation. The outcomes of those relationships are complex and to a large degree probably unpredictable; however, in order to enhance participation, and indeed understand those relationships more fully, the development of even a crude working model such as this could be highly instructive and insightful. The model is undoubtedly non-linear, dynamic, and complex because of the large number of independent variables that contribute to each component such as social capital.

The Significance of Māori Technological Capacity

The relationships between government, the universities, business and commerce, and Māori societies are dynamic, each in term informing the other. Those relationships are founded in trust that itself varies from situation to situation. For example, the effect that the business and commerce sectors have on government policy far outweighs the influence of Māori in that regard. On the other hand the influence of government policy on Māori society can be huge. The universities and their graduates are central to any policy that moves this country towards a technological society through the contribution of leadership and expertise that in turn contributes to the technological capital of the nation. While the business and commerce sector draws on this pool of technology capital so too do the Māori communities although to a much smaller degree.

As defined above, technology capacity consists of both human and social capital where human capital is the pool of people trained in technology, and social capital is the “resources inherent in self-organizing human networks based on trust (mutual expectations of support, engagement), communication (of shared knowledge, norms, values, and understandings), and a shared sense of belonging that facilitate the attainment of shared objectives.” (Tom Healy, personal communication, July 2007) See also Fukuyama (1999).

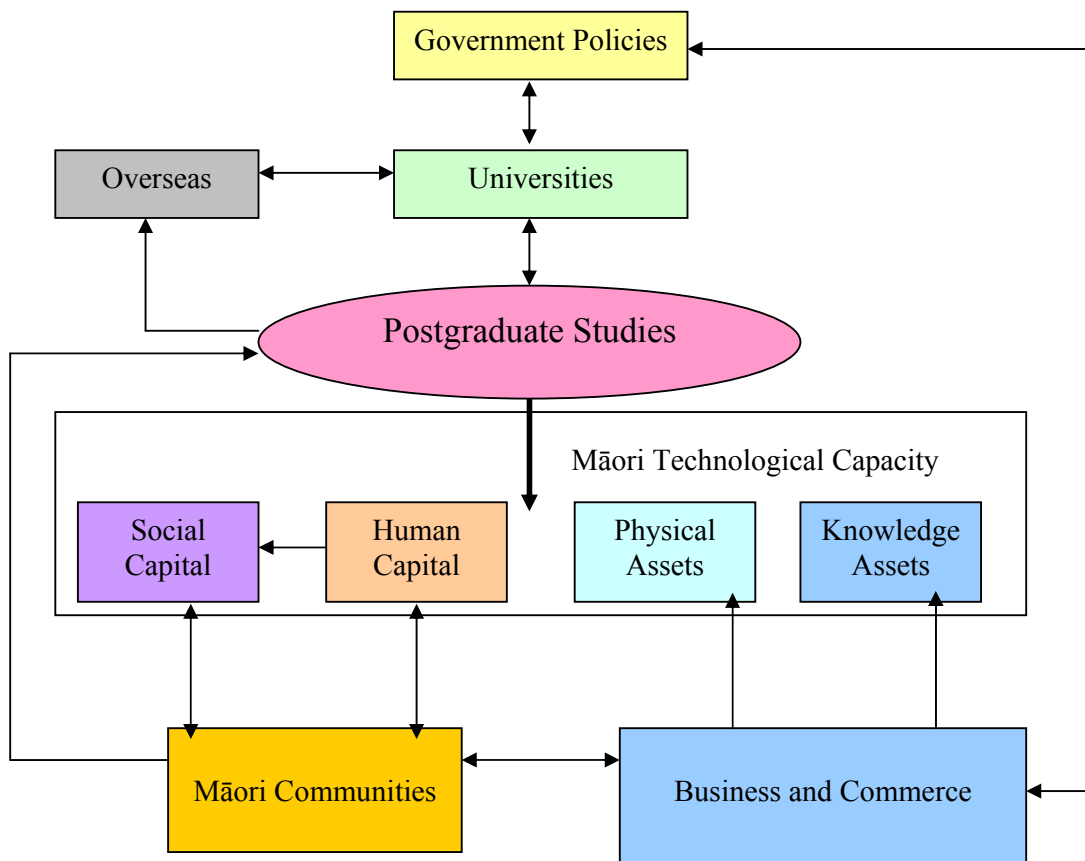


Figure 1. Interactions between Māori technological capacity and government, the universities, the business and commerce sectors, and Māori communities.

From a resource management point of view it is important to understand the interactions that exist between technological capacity and its component parts. Figure 1 illustrates the dynamic relationships that exist between government, the universities, the world of business and

commerce and Māori technological capacity. Central to the scheme are the postgraduate studies programmes that exist within the universities. Postgraduate studies are important because they contribute human capital to TC_m. Human capital development is absolutely essential to the building of Māori technological capacity, although not all human capital development necessarily takes place through the universities. However, most of the human capital development does involve the universities, and hence their significance to Māori technological development.

Not all graduates will remain as part of TC_m, some will be lost to overseas but some will return possibly into the universities; however, in a global environment other possibilities may also be available. Driving the whole development of Māori technological capacity are government policies that shape the educational system of the nation and shape the Māori business community. The point is that in order to increase Māori technological capacity government policies will have to be developed and the universities will have to attract, shape, retain, and support their Māori science students.

Dynamic interactions between government and universities lead to changes in the business and commerce sectors of society that in turn affect government policy. Māori society is unavoidably affected by these interactions. Central to the theme of high-end product manufacturing, services, and innovation is Postgraduate Study programmes as they exist within the universities.

Technological Capacity and Māori Tikanga

The final question that must be addressed concerns whether or not the engagement with, the development of, and the envisaged technological future for Māori, is consistent with Māori tikanga and acceptable to the people as a whole. A lot depends on how Māori perceive themselves and how the ideas are presented.

Table 1. Māori and non-Māori enrolments in doctoral programmes for the years 2001 and 2006*.

Māori or non-Māori in Doctoral Programmes	Year 2001	Year 2006
Māori enrolments in science doctoral programmes	45	51
Total Māori enrolments in all doctoral programmes	233	297
Non-Māori enrolments in science doctoral programmes	1058	1313
Total non-Māori enrolments in all doctoral programmes	3259	4205
Percent of Māori in science doctoral programmes	19.3%	17.2%
Percent of non-Māori in science doctoral programmes	30.3%	31.2%

* **Unpublished data generously supplied by the Ministry of Education.**

An image of Māori, as well as other indigenous peoples around the world, is being promoted by western social scientists that somehow equates Māori with being mentally different from Europeans; for example, that Māori in some way exist in a mystical realm that allows them special insight into the nature of the world. It has been argued that, because of their world view, Māori are not a “quantitative” people that they prefer “qualitative” assessments over “quantitative” (Barnes, 2006). The projection by social scientists of subliminal, self-romanticizing images onto indigenous people around the world should be viewed with a great

deal of suspicion. In terms of mental capacity and ability to reason logically, Māori are no different from anyone else. In 2006, 17.2% of all Māori enrolments in doctorates within the New Zealand universities were in the sciences (Table 1). For non-Māori the percentage in science doctorates was 31.2%; approximately double that of Māori. Does a two-fold difference in distribution of students between science and non-science make a strong case for “qualitative” mentalities and otherworldliness? Other reasons may account for the differences seen in the distribution of doctoral students between science and nonscience, such as availability of good science teachers and early childhood development. The situation does not seem to have changed significantly in the period between 2001 and 2005.

The idea of a technological future for Māori must be examined very carefully; however, only Māori can decide whether this is a future that Māori want and, if not, then what can be done about it? The embracing of a technological future will require the targeting of educational programmes that will increase Māori capacity within the natural and physical sciences and in the realm of mathematics. For this, Māori will probably need the help of government. There is also the point that Māori may not have any choice as to whether a technological future is acceptable or not, because being part of the world may necessitate the acceptance of realities that lie outside of their control.

In areas of social capital Māori are deeply understanding and strongly supportive. Social capital is a resource that results from the interactions between individuals or between groups of people. It can involve the desire for reciprocity between two friends, or the formal complexities that govern behaviour within a ruling body. Trust, networks, idealism, and motivational drives are all associated with social capital. Social capital assists cooperation between individuals and groups thus facilitating the achievement of goals. Modern societies, including Māori, are made up of numerous social groups between which individuals are able to move freely thereby assisting in the transfer of knowledge and ideas from group to group. This movement of individuals between groups is facilitated under Māori social norms because their formalized rituals of encounter enable strangers to come together safely and without duress.

Networking by Māori arises naturally out of tikanga and whakapapa, with subsequent enhancement of knowledge transfer. The closeness of Māori social structures such as exist within whānau and hapū lead to cooperation and facilitation. Many Māori donate freely huge amounts of their time to the reinforcement of Māori social norms, even though their volunteerism may be personally costly. Māori principles of aroha and manaakitanga automatically lead to the production of social capital.

Māori cultural characteristics include many principles of tikanga including aroha, manaakitanga, utu, kotahitanga, rangatiratanga, whanaungatanga, wairuatanga, and kaitiakitanga (Hook, Waaka, & Raumati, 2007) that may also contribute greatly to Māori social capital development. These cultural norms come to Māori from tipuna (ancestors) and thus remain as sources of authority and are transmitted virtually intact from generation to generation. Thus the social norms associated with moral principle are good things that persist for long periods of time with positive effects on social capital development.

Opportunities for Cultural Enhancement

This model of technological capacity is the first to investigate the dynamic socio-economic relationships that exist between an ethnic minority and the dominant colonizing culture, ostensibly as a facilitation of nation building. The model is simplistic and probably inadequate to effectively describe the dynamic and constantly changing economic relationships between two culturally distinct entities such as that between Māori and non-Māori. The non-linear dynamics intrinsic to modern economies must also be considered

especially since the current relationship between Maori and non-Māori is far from equilibrium insofar as the net benefits to Māori have not been maximized; however, the chaotic nature of technological innovation could offer opportunities for Māori to move rapidly to the front without the standard development of competitive leads and the drudgery of conventional competitive development. The major point that is the government led movement towards an economic innovative economy should be seen as opportunity for Māori to improve their position on the socio-economic ladder.

References

- Barnes, H.M. (2006). Transforming science: how our structures limit innovation. *Soc. Pol. J. New Zealand*. Issue 29. Retrieved from:
<http://www.ms.govt.nz/publications/journal/29-november-2006/29-pages1-16.html>
- Clark, H. (2007). Address to the International Confederation of Principals' World Convention 2007. Retrieved from:
<http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=28974>
- Conner, K., Prahalad, C.K. (1996). A resource-based theory of the firm: Knowledge versus opportunism, *Organization Science*, 7, 477-501.
- Fukuyama, F. (1999). Social Capital and Civil Society. Prepared for IMF Conference on Second Generation Reforms. Retrieved from:
<http://www.imf.org/external/pubs/ft/seminar/1999/reforms/fukuyama.htm>
- Hook, G.R., Waaka, T. & Raumati, L.P. (2007). *Mentoring Māori in a Pākehā Framework*. Manuscript submitted for publication.
- Ministry of Economic Development, 2007. Retrieved from:
http://www.med.govt.nz/templates/StandardSummary_22996.aspx
- Ministry of Research Science and Technology, 2006. Retrieved from:
<http://www.morst.govt.nz/current-work/vision-matauranga/>
- Vanhaverbeke, W., Duysters, G., & Beerkens, B., (2001). Technological capability building through networking strategies within high-tech industries. Working papers: Endhoven Centre for Innovation Studies.

Author Notes

The writer acknowledges the generous assistance of David Earle of the Ministry of Education for provision of educational data. The opinions expressed here are entirely those of the author and do not in any way represent the opinions of the Ministry of Education. This research was funded by the Institute for Māori Research and Development.

G. Raumati Hook (Ngāti Mutunga, Ngāti Toa, Te Atiawa) formerly CEO of Te Whare Wānanga o Awanuiārangī, is currently an Adjunct Professor at Victoria University of Wellington, New Zealand and Director of the Institute for Māori Research and Development.

E-mail: raumatihook@clear.net.nz