

# New Zealand Gains From Technology

*New Zealand already has provided much technology to world; indications are that much more is yet to come*

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The technology transfer process is a powerful and versatile tool in the hands of skilled players. If creatively employed, it provides enormous leverage with long-lasting results. Indispensable ingredients are an historical perspective, a thorough grasp of all relevant contemporary factors, sensitivity and perseverance.

These statements can be supported and illustrated by performing an analysis of the New Zealand economy. If one were to treat the nation as a giant and diversified corporate client, and examine it with the elements of the technology transfer discipline, various commercial opportunities can be identified, and strategies implemented for their realization.

What is this discipline? It involves a series of procedures, now increasingly understood, to enable the practitioner to isolate and "capture" bodies of industrial or intellectual property, and then to pass such bodies of knowledge faithfully to another party, in a reasonable and equitable manner.

There are many facets to the activity, involving an understanding of the relevant scientific data, laws and regulations, market realities, political and cultural institutions. Indeed, the entire process has frequently been referred to as "the art of licensing", an accurate description since it highlights the opportunity provided for creativity.

What are the tools employed? They include:

- The recognized forms of intellectual property rights—patents; trade secrets and other valuable industrial information that is now universally referred to as "know-how"; trademarks and copyrights.
- Diagnosis of the corporate client, particularly emphasizing its strengths and weaknesses in the areas of technology, engineering capabilities, marketing, personnel and financial resources.
- A sophisticated appreciation of history and the world economy, so as to be able to discern trends and probabilities in the near and medium terms.
- The ability to research markets accurately, so as to anticipate changing cultural and social patterns that can influence consumer preferences.
- A knowledge of the forms of agreements and business organizations that may be employed to imple-

ment desired transactions; the range includes sales agencies, distributorships, royalty bearing licenses, joint ventures and controlled subsidiaries, as well as an understanding of the use of options and secrecy agreements.

New Zealand provides a large and attractive "canvas" for an "artist" who might be authorized to practice the disciplines of technology transfer on its behalf. I have sketched out such an exercise in the macro-dimension of the entire national economy. More sharply focused efforts obviously can be undertaken with regard to smaller geographic regions, particular industries or economic sectors, as well as individual enterprises.

## Dimensions

Let us begin by reciting some of the relevant dimensions of our subject, the New Zealand nation. We find the following strengths:

1. A stable nation with a population that is virtually 100% literate. There is an excellent compulsory education system, with several high-quality universities offering advanced technological and agricultural programs, as well as cultural curricula. With 3.2 million people in over 100,000 square miles of land, there would appear to be no overpopulation problems.
2. The climate is temperate with plentiful sunshine, and ample rainfall, and no great extremes of heat and cold. The land is relatively fertile for many agricultural specialties, such as fruit growing; it is also well suited to animal raising, particularly sheep, beef cattle and dairy cattle.
3. There are spectacular natural beauty spots, conducive to tourism and sports.
4. There exists a well-established reputation as an effective trading partner, coupled with long experience in negotiating international transactions.
5. Physical proximity to Indonesia, the Pacific Islands and Southeast Asia provide opportunities for development of these populous markets. New Zealand is also relatively close to the large Japanese markets, as well as to Australia, both being relatively vigorous, advanced countries.

There are also several weaknesses:

1. The small population means that there is a limited home market. The export potential of any business activity is therefore crucial.
2. Physical remoteness from the great population centers of North American and Europe counter-balances the advantage of being close to certain "exotic" markets. To the extent that means can be utilized to overcome the disadvantages of distance, positive results may be anticipated. The development of economically viable supersonic transports and more advanced systems of communication should further

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reduce the traditional "problem" of New Zealand's location.

3. An absence of domestic oil reserves, which requires substantial imports for automotive fuel. There are offshore natural gas fields that have been developed, operating hydroelectric and geothermal sources, as well as coal deposits. There is also the possibility to utilize solar and wind energy for various domestic and industrial applications. All in all, however, New Zealand is presently a net importer of energy.

There are obviously many more relevant aspects of the New Zealand economy that could appropriately be included on both sides of this ledger. We are here trying to demonstrate the usefulness of the technology transfer process to economic and commercial development, however, and even this relatively crude profile can serve to illustrate the point.

It is further recognized that one is not exactly preaching the licensing sermon to a tribe of heathens. These principles are already known in many quarters in New Zealand and, in the course of educating myself about this fascinating country, I have come across several impressive success stories. I shall attempt to build upon these in suggesting some further strategies that might be helpful to New Zealand, utilizing specific technologies of which I have become aware in the course of my professional activities.

#### Government Role

At this point, a word would be in order about the role of the host government in promoting technology transfers to and from the economy. In this connection, I have studied with admiration the program of the Development Finance Corporation of New Zealand, particularly since it is directing its efforts to several levels. These include:

- Providing medium- and long-term financing to key local enterprises, especially those which might have difficulty in obtaining such support through traditional banking channels.
- Giving particular attention to small and medium businesses, particularly manufacturing and service businesses that support export trade.
- Organizing a special Applied Technology Program, aimed to increase the economic return to New Zealand from technological innovation. This is a sector that traditionally experiences the greatest difficulty in obtaining initial financing; at the same time, it possesses the greatest potential leverage for expansion.

The persons administering such a program carry heavy responsibilities. They must be entrepreneurial, sophisticated and wise. Excellent performance on their part can have an important positive catalytic impact on growth, employment, and the quality of life.

Let us now get specific and apply the disciplines of the technology transfer process to a few of the many projects which merit attention. In doing so, some historical background and an awareness of current national economies, is relevant.

A significant factor in the development of the New Zealand economy was the introduction of refrigeration

in 1882. This made it possible for New Zealand to export lamb, beef, mutton and veal to the European Market. Later, other degrees of refrigeration made possible large exports of fresh fruits, notably apples, pears, and most recently Kiwifruit.

A relatively recent development in packaging technology could furnish a substantial boast to this traditional activity. It could not only broaden the market itself, but also increase the value added in New Zealand to the exported products. I refer to a technology developed over the past 10 years under the leadership of the U.S. Army, known as retort pouch ("R") foods.

According to this method, a wide variety of meats, fish, vegetables, fruits and even baked goods can be packaged and stored for up to 10 years with no refrigeration. The packaging process involves placing the item in question in specially developed tri-layered pouches made of polyethylene, aluminum, and polypropylene, when appropriately sealed and retorted, much in the same way as canned or tinned goods are processed, the products can subsequently be shipped anywhere in normal cargo vessels.

#### Saves Energy

The quality of the product when removed from the pouch is said to be equal to or better than that of frozen foods. Furthermore, it has been calculated that the product, during its life cycle, requires only about 30% of the energy needed for the processing and preservation of canned or frozen foods.

The U.S. Army has all its military field rations packed in RPs and a commercial market is also developing in the United States with two major food companies in advanced stages of test market. It is expected that there will also be very substantial markets for large-size RPs for the institutional and catering sectors. The Japanese ever on the lookout for important innovations, aggressively began using RP technology several years ago, since they recognized this as an energy-efficient alternative to frozen foods. There will be over one billion RPs consumed domestically in the Japanese market in 1982.

The range of products successfully packaged in RPs includes stews and prepared meats, filleted fish, fruits, fruit sauces and juices, cookies, pasta and potato preparations. It would seem that New Zealand could utilize this technology to its advantage, since it would enable local industry to prepare and package a range of food products having considerably higher added value than the traditional exports of meat carcasses and chilled natural fruits. Expert consulting groups exist in the United States that have the know how to design and erect turnkey RP plants, and also to supply the necessary operating procedures. Once acquired, New Zealand could utilize the technology thus obtained and re-export same to many nearby island economies in which refrigeration and energy are in limited supply.

While we are on the subject of fruit, let us examine New Zealand's outstanding success story with Kiwifruit. Aside from the fact that my family regularly enjoys this delectable item back in New York, I feel particularly close to Kiwifruit because I understand

that the first plants of the ultimately successful strain, Haywards, were sold to commercial growers in 1929, the year of my birth.

The first Kiwifruit was exported from New Zealand in 1947. Since 1953, when 2,500 trays were exported, the volume has increased over 2,000-fold, with the current level of exports exceeding 2.5 million trays. Let us examine this phenomenon in the context of the technology-transfer process.

Care was taken to develop a product that had a sufficiently hardy exterior to sustain shipment over long distances. The fact that the fruits themselves were distinctive in outside and inside appearance also contributed to the valuable proprietary image that was achieved.

#### New Name

The fruit had previously been known as "Chinese Gooseberries", something which projected the misleading image of a relatively tart article not originating in New Zealand. The choice of a new name, "Kiwifruit", was a brilliant stroke. It not only clearly identified the New Zealand origin of this horticultural newcomer, but also created a pleasant sensation; the sound of the word "Kiwi" is catchy and amusing to the ear. This clearly illustrates the value of a well-conceived trademark in export marketing, one of the recognized stages of the technology-transfer process.

Other fundamental strategies equally contributed to the success of this effort. Growers' Associations and The New Zealand Kiwifruit Exporters Association were organized to optimize product quality and efficient distribution. Special packaging was also designed to insure safe delivery of the fruit at its distant destinations.

Perhaps the best indication of the success of this project is that it is now possible to purchase "Kiwifruits" in New York that are grown in California. I am not certain if this has occurred because some enterprising fruitgrowers in California have expressed the sincerest form of flattery, namely imitation, or whether a carefully structured license has been granted from New Zealand. If the former, rather than the latter, is actually the case, it means that an important source of revenue to New Zealand has been missed because of the failure by someone to appreciate the possibilities of the technology-transfer process.

The last point notwithstanding, the persons in New Zealand responsible for the success of Kiwifruit might consider utilizing the resources of the technology-transfer process to increase the leverage of their achievement. Having built a new industry from scratch in 30 years, they might introduce one or more other commercially interesting fruits, or products derived therefrom, into their established distribution channels. This could result in greatly expanded revenues and profits.

For instance, in the United States, we have a very successful agricultural cooperative that operates under the trademark Ocean Spray, which has developed a thriving business based on the cranberry. From its initial product of canned cranberry sauces and jellies, this group has diversified into the

marketing of grapefruit juices and products. Even more interesting, the cooperative has educated the American public to acquire a taste for cranberry juice as a refreshing beverage high in Vitamin C. It has also developed a line of interesting hybrid fruit drinks, including cranberry/apple and cranberry/grapefruit.

If any of the New Zealand fruit growers associations can perceive a market for these products which they could supply more effectively than Ocean Spray, they need not "reinvent the wheel". Instead, they might seek a license, or possibly even formulate a joint venture, with the Ocean Spray cooperative that could enable New Zealand to obtain:

- Appropriate seeds and know-how for the growing of cranberries, a temperate climate fruit which favors special growing conditions most probably available somewhere in New Zealand.

- Formulations of existing and future ranges of products successfully developed and marketed by Ocean Spray in the United States.

- Other special business insights that have been acquired by Ocean Spray over the years, and which could contribute to accelerated growth of this project in New Zealand.

Lest you think that I wish to relegate New Zealand to a pastoral role in the worldwide technological revolution in which we live, the third type of thinking to which I would like to direct your attention is in the realm of high technology. Rather than focus on any particular project, permit me to outline a thorough and somewhat painstaking methodology. This approach is appropriate to the technology-transfer process in any event, because the process itself may be characterized as consisting of 5% inspiration and 95% perspiration.

It has been empirically demonstrated many times that technological "lightening" responsible for the development of world-class inventions, can "strike" virtually anywhere, and that important "breakthroughs" do not occur only within the borders of major industrial powers. For instance, two of the most significant postwar inventions, the shuttleless loom and soft contact lenses were originally developed in Czechoslovakia. Furthermore, perhaps the most important post-World War II advances in steelmaking technology have originated in Austria and Mexico, not in the largest producing countries.

My analysis of New Zealand indicates that there is a combination of conditions here which could spawn valuable high-technology industries that could provide excellent quality employment and important export trade revenue. The basic raw material is ideas and brains, not some mineral or some other natural resource. The output could probably also be easily transshipped anywhere in the world via jet plane, thereby negating New Zealand's traditional geographical disadvantage.

Permit me to list some of the ingredients for this type of technology that are discerned to be present in New Zealand, and would be conducive to germinate the right kind of ideas into serious technological achievements. The trick is to stimulate the right kind of thinking, discover them at an early stage, and then nurture them properly so that they may mature into items of operational significance, within the shortest

feasible lead time.

One wonders whether Ernest Rutherford, had he been born in New Zealand in 1961 instead of 1861, would be likely to remain at home instead of emigrating. Could resources be at hand to channel his inquiring mind and creativity, or would the attraction of the intellectual climates at Cambridge, Harvard or M.I.T. be irresistible. Having done some homework for this exercise, I am inclined to think that the great Rutherford is now much more likely to find congenial academic resources that would tend to keep him at home than existed in the late 19th century in New Zealand. This can be attributed to three realities:

- The present high quality of New Zealand's six universities, as well as the network of scientific and engineering institutions of learning headed by the Central Institute of Technology.

- An enlightened government attitude toward funding and encouraging practical scientific achievement, perhaps best personified by the Applied Technology Program of the Department of Trade and Industry, actively supported by the Development Finance Corporation of New Zealand.

- Jet transportation and improved electronic communications, making it possible for New Zealand's innovators to interface directly with counterparts and others around the world, while also maintaining their headquarters at home.

My background study has revealed three bundles of high technology in New Zealand that appeared to meet advanced international standards. They are illustrative of many more that undoubtedly exist and which could be discovered through further investigation on my part. The salient point is that each achievement is based on brains, not industrial brawn; they serve as useful models for additional initiatives of quality. The examples chosen are as follows:

#### *Advanced Applied Computer Technology*

Through Databank Systems Limited in Wellington, I understand that New Zealand now has one of the most comprehensively computerized banking systems in the world. This group may well have developed software programs and related know-how that could be valuable to banking executives elsewhere who are striving to improve the efficiency of their operations. The existing achievement might be particularly relevant in smaller advanced countries with a population of under 10 million, or with regional authorities in larger economies.

It may thus be possible to interest banking groups in the Scandinavian countries, Austria, all or parts of the Benelux countries, the Republic of Ireland, Singapore, Scotland, Ulster or various Australian states to install these concepts. An added dimension to this picture is the organization of the New Zealand Post Office. Among other things, I understand that this government agency has a comprehensive savings bank operation. It also appears that this know-how, and the computer software utilized therewith, has been made available to the Victorian State Savings Bank.

Thought might be given to combining, or at least coordinating, these technologies into some sort of broad data processing package for marketing outside

of New Zealand. Arrangements of this sort might not merely generate significant revenues for New Zealand, they could expose the talented people who created the systems to additional problems that they might convert into opportunities.

#### *Compressed Natural Gas for Automotive Fuel*

Necessity seems to have been the "mother" of several systems in New Zealand to power automobiles with relatively abundant natural gas derivatives rather than with conventional gasolines. There are other countries, including several member states of the European Common Market, that might be interested in licenses of this technology, provided that its cost effectiveness could be convincingly demonstrated. New Zealand's achievements in this area might also prove valuable in other circumstances requiring compact power generation units utilizing compressed natural gas as a substitute for gasoline.

#### *Advances in Pharmaceuticals, Health Care Products and the Biological Sciences*

In the area of contact lenses, it is understood that a dental technician by the name of Gene Hirst, who arrived in New Zealand from Czechoslovakia in 1939, made his first lens in 1943 and subsequently developed a company that became a world leader in this field. This illustrates how the creativity of a single individual can be magnified into a world-class enterprise, particularly if the innovators utilize the licensing process to transfer their technology to qualified persons elsewhere in the world.

It is not unlikely that New Zealand's enormous livestock population, probably one of the nation's greatest concentrations of wealth, has benefited from a variety of locally-inspired innovations. Serious work has certainly been done in the area of genetics, making it possible for New Zealand to develop a thriving business in the export of prize beef and dairy cattle, sheep and racehorses, as well as semen for purposes of artificial insemination. With the advent of new procedures in biological engineering, which are certainly understood and undoubtedly being practiced by New Zealand's scientific community, one may anticipate significant achievements in the veterinary field.

Considering the high quality of New Zealand's human health care, it is statistically probable that some developments of international significance will occur domestically in this field. This is all the more true because of the level of sophistication in computerization and solid-state electronics already achieved in banking and other areas of business and science in New Zealand. Much as New Zealand has developed world record holders in middle-distance running, so too it has the ingredients to produce winners in selected areas of pharmaceuticals and medicine. Speed and careful organization of the commercialization efforts can contribute handsomely to success.

#### *Conclusion*

It should be obvious from the foregoing that an understanding of the technology transfer process, and a determination to use it boldly and adroitly, can contribute vigor to the New Zealand economy, and to the

world outside. Indeed, the success stories of the past described herein are largely attributable to intelligent deployment of some element of technology.

The scientific revolution continues; the pace of discovery of new technology appears to be unaffected by the gyrations of the business cycle. In today's global recession, with the heightened risk of commer-

cial failure, the role and responsibilities of the technology manager are greater than ever.

This is a worthy challenge. It can affect in a positive way the quality of life of employees of your company, residents of your community, the nation at large, as well as many people abroad who may be involved in international licensing transactions.