INNOVATING IN TRADITIONAL INDUSTRIES

BRIDGING THE KNOWLEDGE GAP

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More could be done to encourage capability-building in our neglected industries.

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According to the New Zealand Government’s Economic and Financial Overview (2014), primary industries alone contribute over 50 per cent of New Zealand’s total export earnings, with primary sector processing (food and forestry) making up more than 50 per cent of the manufacturing sector. Yet there is a view that we are overdependent on these industries and that the trajectory should be shifted to high-value products. This is an important debate and one that should not be taken lightly.

Of particular note, we are encouraged to contemplate what Scandinavia has accomplished in growing from traditional industries toward high-value manufacturing. The gap in our knowledge is not so much whether more high-value manufacturing is needed to build economic prosperity, but how we can innovate in and around our traditional industries to this end. We need to understand the perceived barriers to innovation, and how traditional industries interact with other industries – for example, information and communications technology (ICT), engineering, and manufacturing.

Policy makers, academics, and practitioners alike have toyed with the idea that traditional industries – in particular, farming and land-based industries – were on their way out. In the 1980s the then Prime Minister, David Lange, infamously exclaimed that farming was a “sunset industry” that would be eventually eclipsed by manufacturing and tourism. Recently, physicist Shaun Hendy has championed the need to “get off the grass” and enter an age of high-value products. His arguments are founded on New Zealand’s positive attributes as a country with strong legal and political rights, a low level of corruption, and skills in enabling trade, yet one that struggles to innovate. This is considered the “New Zealand paradox”. Hendy refers to a 2014 report by the New Zealand Productivity Commission which identifies the paradox that lies in our average performance against key economic indicators as reflecting an underinvestment in knowledge-based capital – sometimes referred to as intangible assets. This average performance needs to be lifted, and I will argue that our traditional industries have an important role in accomplishing this.

WHEN CONTEMPLATING WHERE NEW ZEALAND’S ECONOMIC STRENGTHS LIE, OUR ATTENTION IS DRAWN TO TRADITIONAL INDUSTRIES.

WHAT IS A TRADITIONAL INDUSTRY

The boundaries defining traditional industries are not well articulated and terms such as “mature”, “sunset”, “low-tech”, and “non-research intensive” have all been used to describe them. Between 2002 and 2005 a project led by researcher Hartmut Hirsch-Kreinsen studied low- and medium-technology (LMT) industries. The Policy and Innovation in Low-Tech project (PILOT), recognised gaps in knowledge related to industries other than the more fashionable high-tech industries. The term LMT stems from the OECD classification for research and development (R&D) intensity – that is, industry sectors that are not research intensive or which have a low expenditure on R&D in relation to turnover. Building on this classification, we recognise that traditional industries can include those supplying high-tech products to LMT industries – which is a point of departure from the conventional OECD classifications. The same principle applies for basic and applied science that has been introduced into traditional industries, including chemicals, pharmaceuticals, and biotechnology. The idea that traditional industries are “carriers” of high-tech and/or knowledge-intensive science originates in the work of University of Sussex researcher Keith Pavitt, which classifies the innovation modes of different sectors. Broadly, traditional industries, including primary, manufacturing, engineering, and service industries, fall into the LMT category.

SUNSETS AND SWITZERLAND

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So why do traditional industries matter? Key concerns arising from the PILOT research included a lack of awareness of innovation-supporting policies that were not focused on R&D; the need to improve measures and support activities to capture the knowledge base and capabilities of LMT firms; the need to develop the capabilities of firms to meet the demands of cross-company cooperation; and the need for policies to encourage generation and diffusion of knowledge across sectors and to promote stronger interrelationships between sectors.

The PILOT researchers noted that the innovation-generating activities of LMT firms are not always captured in R&D statistics. This would suggest that classifications such as that used by the OECD might not accurately reflect broader innovation in the economy.

ARE WE REALLY THAT FAR AWAY?

There is much talk about New Zealand’s great distance from export markets. However, a little reflection will show that this is not necessarily the case. In many instances we are no further from Asian and Pacific Rim markets than are Europe and the United States. Indeed, we are relatively close to some of the largest markets in the world with whom trade liberalisation agreements are being made. The government’s Business Growth Agenda (2014) strongly supports building high-quality free trade agreements (FTA) in the Asia-Pacific region. It is often mobility at borders that can adversely affect the timeliness of exports to market rather than physical distance.

In situations where the logistics is challenging, New Zealand’s distance to market has also spurred innovation. This was the case, for example, with the export of fresh foods, including meats, dairy, fruit, and seafood. Research by QPod Systems, which manufactures pallet-sized refrigerated units for transporting fresh goods, showed that it was more difficult to control the atmosphere inside partially-filled refrigerated sea containers. The solution was a “refrigerated mini-container and returnable packaging system” that could fit inside containers or land transport alongside other goods. The QPods are designed to reduce spoilage in the supply chain and offer new opportunities for efficiencies – including the potential to lower costs by bypassing distribution centres and delivering directly to retail stores. The pods are not restricted to fresh foods but also have applications in the transportation of medical and biotechnology products. They are a good example of initiatives that mitigate the distance barrier while providing a solution that can have a radical impact on the supply chain.

Building Better Lawnmowers

Kenneth Husted of the University of Auckland Business School has argued that firms do not need a sizeable market in order to innovate, but they do require access to customers that are willing to collaborate and which have interesting needs that can be fulfilled through the development of new technologies. Once the needs of such customers are met, building scale for export is more straightforward. Husted points to his native Denmark – a country with similar demographics to New Zealand – as an example of a nation reliant on the primary sector that has successfully built up, and now competes in, high-value industries. Moreover one of New Zealand’s perceived weaknesses is a lack of advanced customers able to work with firms to co-develop new products. To a large extent this is true, particularly when it comes to industries that are new to New Zealand’s landscape. But this could be overcome if our politicians and industry lobbyists focused their energies on strategising ways to innovate high-value products through traditional industries. The country’s future science and technology development could first serve these traditional industries with a view to exporting globally.

One example of an outstandingly successful high-value manufacturer is Compac Sorting Equipment. The world’s second-largest maker of sorting equipment, Compac supplies machines and software, predominantly for sorting round-shaped fruits and vegetables. The company exports to 50 countries and employs some 400 staff globally, of which more than 100 are committed to R&D. Compac continues to push the limits of technology with sorting, imaging, monitoring, and software development.
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A smaller enterprise that is also making significant headway is Fieldmaster. This company is best known for its grass cutting equipment, but also produces sweepers and vine trimmer/pruners. Its current technological developments include solutions for airport mowing, which must be done at speed due to time constraints – to put this in context, Auckland Airport has about 700,000 m² of grass that can only be mowed once a week during a four hour window. Fieldmaster is also working with the Bay of Plenty Regional Council to develop a hovercraft capable of mowing regenerative mangrove seedlings.

Companies such as Compac and Fieldmaster serve advanced local customers and export proven products globally.

The 2014 Technology Investment Network (TIN) report recognised the emergence of manufacturers servicing traditional industries, including RML Engineering, which produces automated equipment for packaging, and Metalform, which provides solutions for sheet metal processing. The report also profiles a number of well-established firms, including Gallagher, which is a leader in animal management, and Scott Technologies, which supplies automation to the meat industry and produces other products such as honey and wax separators. These examples suggest we do have world-class expertise, and that there is an opportunity for knowledge spillover that could encourage technological improvements in other industries.

WORKING WITH THE GOVERNMENT

It can be argued that targeted government procurement could stimulate innovation and encourage collaboration and the creation of networks among local firms. Around the world public procurement is a significant means for stimulating innovation, providing a clear signal about investment opportunities and helping governments to achieve their goals. Such opportunities may arise through a buoyant economy; however, they may equally arise from disasters such as the 2011 Christchurch earthquake, or in response to challenges related to climate change. If conducted well, public procurement can create a demand for new and value-added products and services while nudging businesses toward innovation in a relatively low-risk environment. Ultimately the economy can benefit from increased technical proficiency, leading to the building of new capabilities and competitive advantages which may not have eventuated without such intervention. In particular, traditional industries can benefit directly when the aim of the procurement coincides with such things as: the built environment, including construction, infrastructure, and utilities; climate change and its effect on the environment; or the sustainability of New Zealand’s primary industries through government partnerships.

DEVELOPING OUR KNOWLEDGE BASE

As a country, we need to develop scientific and technological competencies around our traditional industries. By drawing on the knowledge base of these industries we will contribute toward building our high-value sector. There is, of course, room for entirely new industries to develop. However, the present argument is that the focus should not be on creating new industries, but on identifying and leveraging opportunities in industries in which we already possess a strong knowledge base. In other words, we need to recognise how existing technology and science in New Zealand can be adapted and implemented in traditional industries. For example, we are already seeing greater integration of digital devices in the primary sector – including new applications, automation and robotics, and cloud computing.

Primary Growth Partnerships (PGP)

The government is currently funding Primary Growth Partnerships (PGP) to encourage innovation in the primary sector. The Draft National Statement of Science Investment 2014-2024 addressed PGP as long-term programmes that are “primarily business-led and market driven innovation programmes that work along the primary industry value chain”. They encourage collaboration between firms, research and industry bodies, and the government, with about NZ$65 million in matched funding available per year. The New Zealand Institute of Economic Research (NZIER) has estimated the economic benefits of these partnerships to be NZ$111 billion per year, from 2025. Current projects include harvesting technology for the seafood industry that can target specific fish species, and the size of individuals within them, and which deliver fish in better condition; steep slope harvesting solutions for the forestry sector; science-based farming of Manuka plantations for honey production; value chain solutions in the meat, dairy, and wool industries; and solutions for waste in the red meat and forestry industries.

Comvita

Natural healthcare company Comvita has harnessed science to lift the value-add of its products. In 1974 the company began making honey-based products and quickly found that its natural health principles were a foundation for competitive advantage. Since then, it has produced ranges of shampoo and skincare, as well as vitamins and supplements. During the 1980s and 1990s, Comvita began to experiment more intensively with bee pollen and borage oil, employing a business consultant to formalise processes and systems, including the research programme. In the 1990s researcher Peter Molan of the University of Waikato found manuka honey to have high levels of antibacterial activity, and along with colleagues he established the Unique Manuka Factor (UMF) rating. Comvita seized the initiative, becoming the first company to commercialise manuka honey for its medicinal elements. The company continued to diversify, adding olive leaf extract, broccoli extract, and omega-3 fish oil to its product line. Through its commitment to R&D, Comvita set an example for other manufacturers which increasingly are testing natural products for human consumption and remedy.
Scientific research has also proven to be useful for validating traditional products – for example, those based on honey and seaweed (see sidebars on Comvita and AgriSea). Comvita, the first company to commercialise manuka honey using the scientifically-based UMF (Unique Manuka Factor) rating, fostered research collaborations through Comvita Innovation and progressed to conducting clinical trials on olive leaf extracts. In doing so, Comvita created a significant price premium for its honey and olive oil extracts. Similarly, AgriSea is focused on validating products for human consumption and highlighting their medicinal properties. Its research extends to collaborating with scientists to establish a sustainable practice, other than shoreline gathering, for harvesting seaweed.

WHAT WE NEED TO FIND OUT

The purpose of this article is to provide an overview of innovation in traditional industries and to identify gaps in our knowledge and understanding, and to outline some of the perceived barriers to innovation in these industries. It is evident that we need a better understanding of how innovation occurs in traditional industries and that there should be discussion about what policies should be established; what funding is required; and how researchers from universities, CRIs, and industry bodies could best collaborate with firms. We now understand that low to medium-tech (LMT) industries are not void of high-technology components, and that traditional industries typically are below the radar from an innovation perspective. Furthermore, there are large industries, such as forestry, where little is known compared with their counterparts in places such as Scandinavia. Others, such as the equine industry, which contributes some $4 billion annually to the New Zealand economy, are all but invisible.

We also need to remind ourselves that some technology firms began life servicing needs in traditional industries. PowerByProxi, for example, started out providing wireless power technology to John Deere’s forestry harvesting equipment and it continues to sell into the agricultural, forestry, construction, and mining industries. And one of the country’s most prominent technology companies, Xero, has partnered with farm software specialist Figured, to offer a service called “Farming in the Cloud”. Examples such as these need to be brought into the forefront of discussions when seeking ways to establish a robust high-value sector. In summary, we must strategise with what we already have, take a long-term perspective, and embrace the certain – if slower – growth that innovation in traditional industries offers.

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