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OF COMPETITION AND REGULATION INC.**

**Information and Communications Technologies
in New Zealand:
Nine Case Studies
Conclusion and Recommendations**

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for the Ministry of Economic Development
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Integration of Findings

Whilst all the nine case studies span a wide variety of business size, type, sector, product and focus, some clear overriding themes emerge that link these successful ICT users. These themes provide a basis from which other businesses may benefit in their use of ICTs, and offer some key insights for ICT policy formulation.

Lessons for Businesses

The OECD cautions that investment in ICTs is “no panacea”. “Firms may well overinvest in ICT, either in an effort to compensate for lack of skills or competitive pressure, or because they lack a clear market strategy. However, ICT is no panacea, but a technology that can be made to work to enhance business performance.... Moreover, ICT requires many other changes to make it work.”¹

Know your Business

The overwhelming finding of the study is that successful implementation and use of ICTs is contingent upon the extent to which managers and decision-makers first know and understand the characteristics of their product, business, industry and trading environment. If managers and decision-makers know and understand these factors, then they will be clear about the ways in which they derive value from their businesses, and therefore have a much clearer understanding of both where the ICTs will fit in their individual value chain, and the extent to which they can add to the value created. This is true irrespective of whether the business is large (eg Fonterra) or small (eg Planet Skin), and irrespective of industry sector (eg manufacturing – Gallaghers; medicine – Wakefield Radiology).

If managers and decision-makers have a clear understanding of their business, industry and environment (that is, their individual ‘value chain’), then it is much more likely that they have a clearer conception of the ways in which information contributes to their creation of value. For example, they will know whether the greatest value from

¹ OECD. 2003. *ICT and Economic Growth: Evidence from OECD Countries, Industries and Firms*. Paris: OECD. <http://www.oecd.org>. p 12.



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information comes from exchange with external parties (eg marketing at Planet Skin) or from co-ordinating decisions and processes internally (eg supply chain management at Fonterra; ERP at Gallagher Group). They will be aware of where the costs emanate, and where risks to the business arise. This enables the managers and decision-makers to focus on the ways in which any technology will reduce the costs and risks faced by the business. They will also be aware of their relative advantages and disadvantages with respect to their industry and their market, and once again, where a new technology of any nature will offer advantages. This level of analysis also enables managers and decision-makers to identify new needs, and provides them with the incentives to acquire information about new ways of addressing business and industry problems. It is significant that most of the managers in the case studies learn about new technologies and applications from within their industry, where applications have been developed as a result of businesses seeking 'solutions' to real problems and challenges facing the business of the industry, rather than from IT vendors and generic management consultants. This is consistent with Locke (2002, 2003).

Knowing their product also enables managers and decision-makers to determine whether their product is one with a high information component, and therefore one which is a likely candidate for substitution of old production technologies and distribution methods with electronic ones (IT-driven improvement, as defined by Upton (1995): eg Wakefield Radiology; Electoral Enrolment Centre), or whether it is a tangible product or service where the use of technologies is principally as a support to producing the products from which the company derives its returns (Upton's improvement-driven IT: eg Planet Skin; Gallaghers). Knowing the product and the nature of the processes also enables a clear understanding to be gained of the relative competitive advantage offered by any technology to which the firm has access (eg Kenex), and therefore which parts of the operation warrant protection, and which are no threat to the continuation of those advantages.

When this degree of clarity is present, then it is much more likely that the firm has all of a clear strategy to guide its decisions and operations, a fuller understanding of the ways in which any technology fits into the value-creating process and the incentives to pursue and implement new technologies. Thus, the technology purchase and implementation becomes an integral part of the firm's strategy, whether it is the use of



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a technology to gain a competitive advantage (eg Wakefield Radiology) or investment being undertaken merely to “keep up with the state of play in the industry” (eg Fonterra).

These firms will be better placed to implement ANY new technology successfully. The technology purchase is much more likely to be based upon a well-reasoned analysis, and implementation planned and prioritised in such a way that either the most valuable or the most fundamental components are installed first. Thus, success is more likely. Notably, well-reasoned analysis also reduces the probability of a firm investing in a technology merely because it exists and has been implemented elsewhere. Knowledge of specific firm and industry characteristics will mean that reasoned abstention from specific purchases in particular circumstances can be a profitable strategy.

Whilst none of these characteristics are unique to ICT investment, if these mechanisms are in place, then the probability of a successful ICT investment and implementation is increased. If the purposes underpinning ICT investment are well-understood, then it is more likely that the firm is both receptive to the need to invest in complementary systems in order to make the ICT investment work successfully (Brynjolfsson and Hitt, 2002), and has put in place processes to monitor and adjust complementary systems to align with the new investment.

As information is important to all businesses and processes, and all businesses and industries are subtly different, then there is no one single formula for investing and implementing ICTs. There is no substitute for business managers and decision-makers knowing their own business and industry, as this enables them to select, customise and prioritise the development. The managers in the case studies were clear that the ICT application was “an enabler” for a change they wanted or needed to make in their business processes and not an end in itself. As the case studies show, specific factors in the New Zealand environment make investing in ICTs proven in foreign environments is no guarantee of success as the size and scale of New Zealand place different requirements on some businesses. Investing in ICTs without the requisite level of business, industry and environmental understanding is little better than investing in a lottery.



Human Capital Factors

The previous section indicates that the quality of business analysis and decision-making available to businesses is critical to successful ICT implementations. Each of the successful organisations examined had access to these skills. It is noted, however, that the requisite human skills are generic business skills, not specialist ICT technology skills. None of the firms interviewed indicated any problem in accessing sufficient technical advice or expertise for their respective purposes. This implies that it is unlikely to be a shortage of technical ICT skills in the New Zealand marketplace.

However, almost all noted a significant difficulty in recruiting staff with sufficient business and industry knowledge, experience and skills particularly in change management and process analysis and improvement. This lack of skills crosses all sectors, from agriculture through to government. The significant problem for New Zealand appears to be lack of skilled and experienced business 'knowledge workers' with an understanding of both information and how it contributes to the creation of value in businesses, and business processes in general. In light of this shortage, many firms were required to 'grow their own' knowledge workers. This is not surprising, as the human capital required is specific to either the industry or the firm concerned. However, if firms are successful trainers and educators, they become exposed to risks of high-skill workers being lured away to markets where higher salaries are paid.

The reality is New Zealand is competing in a global market for these skills. As long as New Zealand salaries for these skills are lower than the international average, New Zealand is more exposed to the newly-trained and now experienced staff being attracted away to other economies. This means that the average skill and experience level of knowledge workers remaining is less, compromising the calibre of decision-making, and raising internal training costs. The lower-skilled and less experienced staff remaining are also consequently less productive. This leads to lower levels of output for the same levels of input, and poorer decisionmaking, than in the economies where the more highly-skilled and experienced staff migrate. Poor decision-making undoubtedly increases the costs of both implementation and failure in ICT investments.



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Nonetheless, successful firms are all characterised by the degree of emphasis that they placed upon the quality of their staff. All were committed to ensuring that their staff members were fully involved in the ICT implementation, and all placed a very strong emphasis on the importance of education, training and learning in making the implementation successful. Using operational staff and key customers as ‘super-users’ in the specification and design of systems, and as resources for training and ongoing user support is a theme that links all the large firms. These staff members become ‘owners’ of the system, reducing opposition to changes and distributing responsibility for the system down to all levels of the organisation. This indicates these firms favour a development path approach to the on-going improvement of their ICT and processes in that the people who will be involved in future developments are the users of the system. This contrasts with the “black box” approach where the development and improvement of IT within firms is the exclusive area of technical specialists and outside consultants.

Lessons for Policy

The businesses that participated in the case studies were unanimous in their opinion that there was little that the government has or could have done by way of an ICT policy that would have made any difference to the ways in which they undertook the decision to invest in ICTs or the implementation of their respective systems. The consensus was that the government had no role to play beyond its broad responsibilities to provide a sound and certain legal and commercial environment in which they could undertake their business operations.

An ‘Information’, not a ‘Technology’, Economy

Several participants questioned the need for an ICT strategy at all. This comment appears to arise from the current very strong focus of the policy on the ‘technology’ aspect rather than the ‘information’ aspect. One comment made was that the focus was misplaced: “if businesses need an ICT strategy, then perhaps we should have an electric motor strategy and a motor vehicle strategy too”. Most, however, were supportive of the government having a commitment to a ‘knowledge economy’



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strategy, as this placed the focus upon people, skills and applications rather than “widgets and gadgets”. The focus would thus be placed not upon the use of specific technologies, but the use of information to create value. This would be consistent with growing a ‘knowledge economy’ rather than measuring and incentivising the creation of a ‘technology economy’ that has merely extended the ‘industrial economy’ focus upon machines to include computers and computerised applications.

No Evidence of a Significant Infrastructure Problem

Only one case study company identified any problems at all in relation to access to infrastructure. Wakefield Radiology has an access price issue in one location. That only one company had a problem, and that it is this company, is not surprising. This company has extremely large information exchange volumes that are not characteristic of the typical business, and this is a problem for ‘leading edge’ businesses. The remaining companies reported no difficulties, with Kenex commenting on the very favourable infrastructure access and price environment compared to Australia. The one company where access might have been a problem, Fonterra, has preferred to use its own mechanisms to create its own service rather than rely upon government-sponsored provision (ie Project Probe). This implies that for most business sectors, unless there is a significantly large co-ordination or contracting problem, existing commercial provisioning of infrastructure is satisfactory. Moreover, the existing competitive environment enables in-house solutions to be built if the commercial infrastructures are prohibitively expensive or do not meet customer needs (eg Fonterra, New Zealand Post).

Legislative Rather than Infrastructural Barriers

Those businesses that did identify barriers indicated that these were legislative and regulatory rather than infrastructural. The Electoral Enrolment Office, for example, identified that delays dealing with review of their Act and implementation of the electronic signature components of the e-government initiative were preventing them from fully and efficiently utilising the capabilities of their systems. Others noted that the requirements of new legislation needed to be examined more carefully for the informational consequences they imposed upon businesses. Anecdotally, for example, food-labelling legislation has forced supermarkets to provide computerised



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labelling in-store, using information on food content without consideration of the liability for provision of the information upon which the printouts are based. This has exposed supermarkets to risks of being liable for providing information that may or may not be accurate. These aspects of liability are not addressed in the legislation, and impose additional risks upon the business.

A Role in Promoting an Information Culture

Some participants, however, stated that there was a role for government in addressing the basic lack of understanding about the ways in which businesses create value and how that value translates to improved economic and social outcomes, so that the animosity and ambivalence towards businesses may be reduced. For example, a commitment to compulsory economics and business classes in secondary school may help raise the basic level of understanding about the functioning of economies and businesses. This would help to improve the basic level of business decision-making skills and would create an environment where firms face fewer obstacles and disincentives to being successful in any sphere. It also provides a sound and consistent base upon which firms and industries can contribute to the skill and knowledge base through 'learning by doing' and experience.

Furthermore, greater levels of understanding about information and the differences between the economics of information products and tangible products would make it easier for participants in all sectors to be innovative. This is a far bigger task than any one business or industry can undertake, so is seen as an area where government could take a role, as both a participant in the marketplace, and as an educator and promoter. This requires promotion of an 'information culture', where information is treated as an asset with value, where returns are not just able to be made from information, but required if the New Zealand 'knowledge economy' is to thrive.

Aligned with the promotion of an information culture is the promotion of a business culture that is aware of the role of risk and how it can be addressed. All new ventures and product developments involve risk. Development of new information products is likely to be more like an R&D investment than the development of a standard tangible product. The complementary learning identified by Brynjolfsson and Hitt (2002) as



necessary to ICT investments is itself an R&D process for many firms, as each firm and business is unique so the complements may be unique in each case. Unless participants have an understanding about making investments under uncertainty, then less than optimal investment may be undertaken. The Kenex case, in particular, illustrates that some government entities may not have a very clear understanding of the use of alternative structures such as joint ventures to share risks associated with new product developments. This may be holding back the development of new products and applications where government is the logical risk-sharing partner.

Government as a Participant in the Information Economy

Government has a very significant role to play in an information economy as it is the controller of a significant amount of information and information management processes. Government can act as a role model in the use of information. By being clear about its data and processes, and the distinction between the two, government can allow value to be created from its resources for the benefit of New Zealand. Government has a particular responsibility in its roles in health and education, both information-intensive activities where government activities as a market participant set the market conditions. Government must be equally cognisant of its responsibilities to know and understand its own data and processes as the private sector if it is to be a successful implementor in its businesses.

Government also has an obligation to the taxpayer to allow state-owned information to be used to grow the knowledge base from which the country can benefit. There are inherent conflicts at times when government entities are owners of information and processes, charged with making a profit, and government as custodian of the public good. There are also inherent conflicts where Government has the responsibility for ensuring confidentiality of information about individuals. Government must be clear about its priorities in the event of any conflict. Picking the wrong priority may result in a negative impact on the stocks of knowledge and the incentives to create more knowledge and business opportunities from which New Zealand may benefit.



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Summary

The case studies have raised some very significant implications for both business actions and policy activities. The positive outcomes show that there is reason for optimism that New Zealand companies are successful implementers of ICTs. However, the cases also illustrate that the country is a very long way still from having a vibrant information economy. However, the learning from these studies provides a solid platform from which further research and learning can be undertaken to move New Zealand towards this objective.



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Appendix

Questionnaire

Business Model

Is technology a key part of this organisation's goals/core business activities?

Is this company an information company or not?

Primary competitive differentiators (competitors?)

What are the information flows (both manual and electronic information) within the organisation?

How does the business use information?

How do the technologies that generate, transmit, store and process info have been employed to increase the productivity (or future productivity) of the organisation?

Production Processes

What are the transformation steps?

What are the inputs to process?

What are the outputs?

ICT Applications

Are applications employed to address business model, competitiveness, and information usage requirements?

How were the applications implemented? Inhouse, off the shelf, customised?

Who implemented the applications and why were they implemented?

When were they implemented? Within what time frame and why this time frame?

Management of ICT investments: assessment, planning and implementation

How have the ICTs employed supported and enhanced core activities?

Benefits and Costs of ICT Applications

What level of experience with ICT investments does the staff or organisation have?

Were there any unexpected problems and benefits encountered with the implementation and operation of the ICT applications (successes, failures, lessons)?



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Quantify benefits and costs (gains in productivity, market share and competitiveness) of ICT?

Restructuring for ICT Applications

What were the direct and indirect changes to accommodate implementation of the ICT applications (organisational processes and human resource management changes)?

How does the organisation support lifelong learning?

What other investments did the organisation have to make as a result of technology implementation?

History

What production process were used in past (before ICT implementation)?

Is the current ICT application a substitution for the old process or a new application?

Has the technology led to the business model or has the business model led to the technology?

Context

Assessment of the effects of NZ policy, business and legislative environment on the ability of firms to achieve productivity improvements through investments in both ICTs and the complements required

Financial Information

What is the asst base of the firm?

What proportion is ICT (hardware and software) as a proportion of total assets?

What is the workforce composition – information workers as a proportion of the total workforce?



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