Application of ICTs in the NZ Services Sector

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Introduction

This note is a brief submission in response to the Productivity Commission's request for input on its first Interim Report in its inquiry on Boosting Productivity in the Services Sector (the Interim Report). We focus just on use of information and communication technologies, primarily the internet, by New Zealand service businesses.

Our view is that, amongst the three options the Productivity Commission sets outs (page 5, Interim Report), the Commission should investigate the application of ICTs by New Zealand businesses more fully. We think this should involve a more detailed look at adoption of advanced ICT applications, such as online ordering and payment via websites, rather than uptake of basic technologies such as internet access and email.

It may be helpful to think about the potential productivity gains from specific ICT applications first, and then work backwards to determine if there are barriers to adoption of particular applications by New Zealand service firms.

We also provide some brief thoughts in response to the request (page 7, Interim Report) to give suggestions that might help refine the scope of this topic. These reflect our current views on the underlying factors that could be worth investigating further, including complementary factors like education and skills, take-up of cloud and platform services, and diffusion of technology amongst firms.

The nature and scale of the ICT-use challenge

We see that New Zealand firms have good connectivity, with 96% of firms in the latest Statistics New Zealand Business Operation Survey reporting that they have access to the internet. And we note also that firms in the services sector make greater use of ICTs than primary and goods producing sectors.

For example, Figure 1 shows the median, lower quartile and upper quartile of the use of two key online functions – ordering and payment – among New Zealand primary and manufacturing sectors versus service sectors in 2012. The rate of adoption of these technologies is consistently higher for service sectors.

Figure 1 Use of online ordering and online payment by New Zealand businesses, 2012.
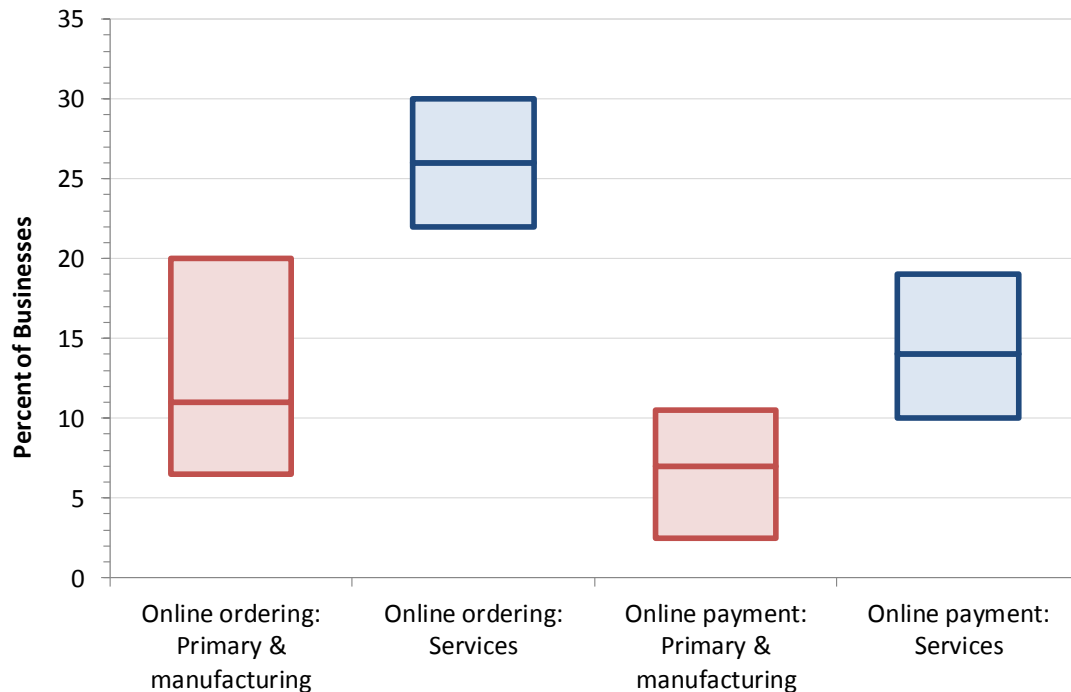
Source: Analysis of the Statistics New Zealand Business Operations Survey

We also note, however, that takeup of e-commerce options is not high in absolute terms. To take one specific example, only 27% of New Zealand retailers take online orders and only 18% accept online payments. This is despite high and growing use of online shopping by New Zealand consumers and internationally. For example, the Google Consumer Barometer (2012) revealed that of people in New Zealand purchasing:[1]

- leisure flights, 79 per cent purchase on line,
- event tickets, 63 per cent purchase on line, or
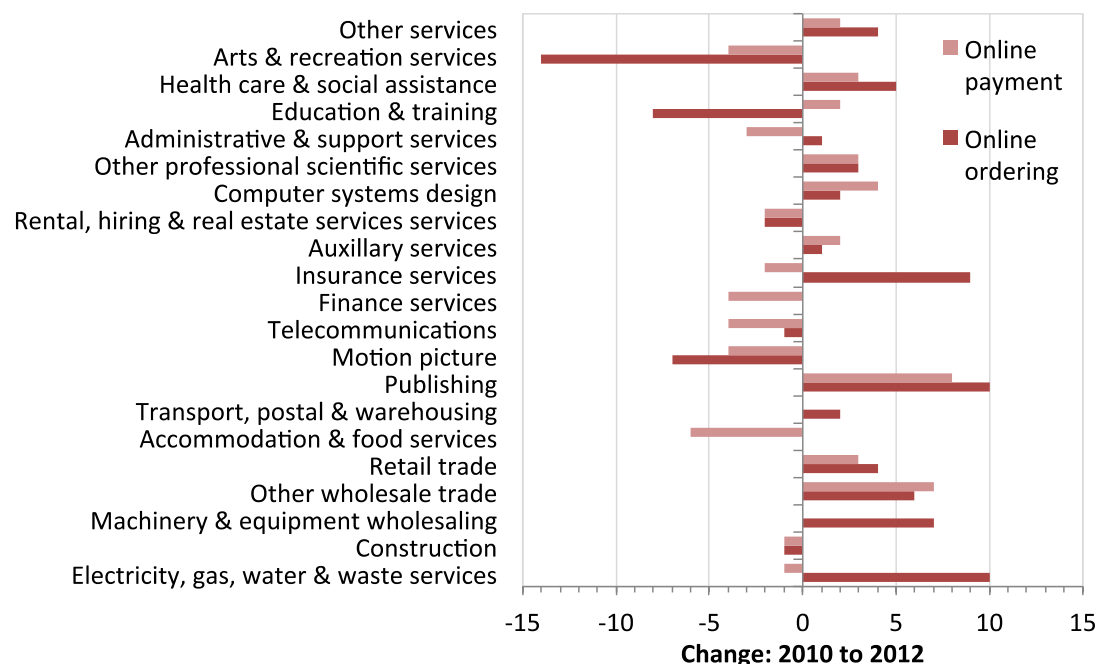- computer software, 44 per cent purchase on line.

Similarly a PwC study estimated that in 2012, 1.9 million New Zealanders made online purchases, spending on average $1,659 online during the year, with 81 per cent of respondents expecting to spend the same or more online during the following year.[2]

We also see that growth in the use of e-commerce options in the past two years has not been high among service sector firms. Figure 2 shows the change in availability of online payment and ordering on the websites of New Zealand firms in service industries between 2010 and 2012. We suspect many of the differences are largely due to sampling variation, but in any case there does not appear to be a clear trend in take-up of these technologies.

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[1] See http://www.google.com/think/tools/consumer-barometer.html

[2] See http://www.pwc.co.nz/retail-consumer-industry-sector/publications/australian-new-zealand-online-shopping-market-digital-insights/

Figure 2 Change in use of online payment and ordering by New Zealand service firms, 2010 to 2012.


Source: Statistics New Zealand Business Operations Survey

As noted in previous work for the Productivity Commission's Symposium (Glass, 2013), there seems to be little difficulty in convincing New Zealand firms to connect to the internet. The troubles seem to lie in encouraging them to make use of the technology options to which they have access, and to transform their business processes in ways that generate real productivity gains.

The behaviour of New Zealand retail businesses behaviour seems unusual, given the potential gains from trading domestically but also from being able to access the enormous number of consumers outside of New Zealand. This behaviour might be more explicable if retailers face specific barriers to using these technologies.

We also query whether use of e-commerce is comparable with our international peers. Figure 3 shows the use of "online" sales and purchases by businesses across OECD countries in 2012. The rates for New Zealand are high, but the definition of online sales and purchases varies across countries. In New Zealand it includes transactions initiated by email with payment completed offline. In our view using email in this way offers minimal productivity gains over similar methods such as initiating transactions by phone or fax. This definitional difficulty may explain why firms report being high users of online sales options, while simultaneously reporting that they are unlikely to allow online ordering or payment on their websites.

Figure 3 Businesses selling or purchasing over the internet, 2011.
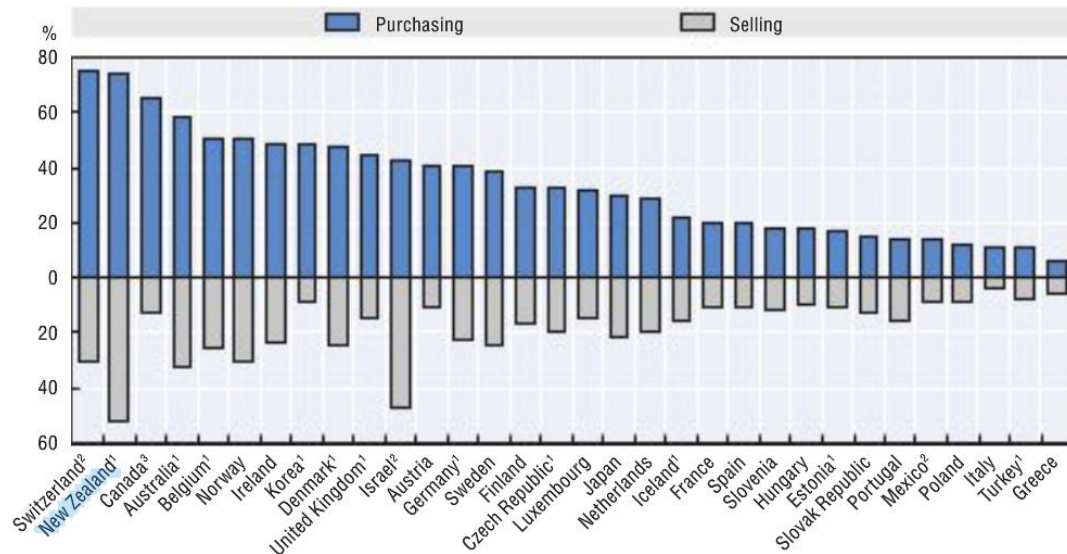
Source: OECD Internet Economy Outlook 2012.

Complementary factors

We agree with the Commission's proposition that complementary factors are important for the successful application of ICTs. This could include the skills of workers and the ability of businesses to integrate new technologies with their existing systems.

In terms of worker skills, it is not clear that New Zealand students are choosing to invest in ICT skills at rates that might reflect the increasing importance of ICT in the economy and the potential productivity gains to their future employers.
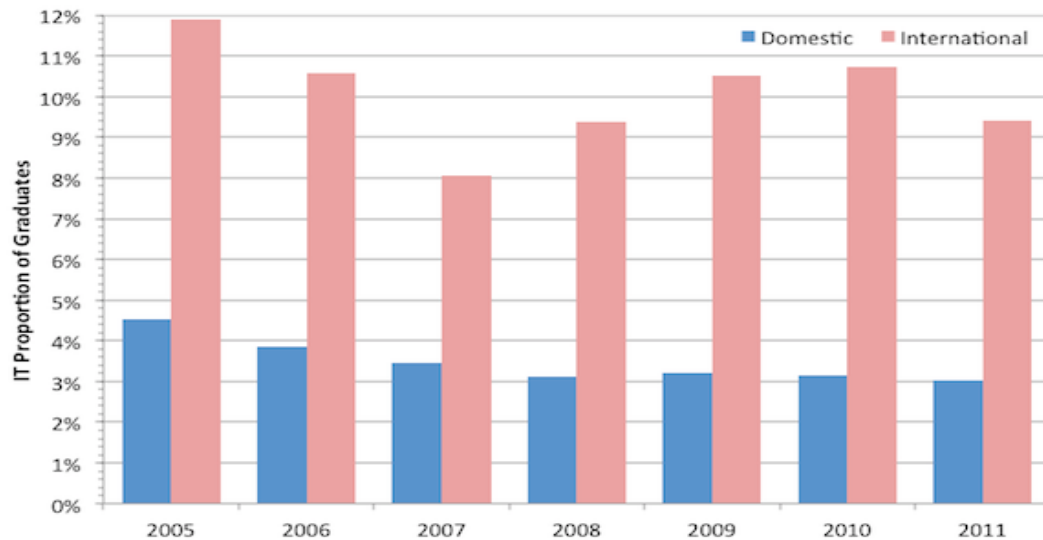
For example, Figure 4 shows the proportion of students graduating with Bachelor or postgraduate degrees in IT. Around three per cent of New Zealand residents graduate with an IT degree, and the ratio has generally been declining over time. In contrast, the rate of graduation with an IT degree is around three times higher for international students studying in New Zealand.

This suggests that the quality of IT education in New Zealand is reasonably high, or else it would not be attractive to international students. In addition, several large categories of ICT skills are listed by Immigration New Zealand on the long-term skill shortage list.[3] Despite the apparent shortage of skilled IT labour, it appears that the "pipeline" of workers with IT skills in New Zealand is not filling up.

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[3] See

http://www.immigration.govt.nz/migrant/stream/work/skilledmigrant/LinkAdministration/ToolboxLinks/essentialskills.htm

Figure 4 Proportion of degree graduates studying information technology.

Source: Calculated from Ministry of Education data.

Assuming that students make rational choices about what to study based on career prospects, the question is why New Zealand students are not choosing to study IT if these skills are in demand. This raises questions about whether students view IT as an attractive career, or if not, why they do not. Or perhaps it is not necessary to have a university degree to work in IT, and attention should be paid to whether appropriate resources are being directed to alternative forms of education. For example, it may be relatively easily for people already in the workforce to gain IT qualifications, and that may be where market demand for such training emerges.

The core question is whether there any barriers (e.g., in the education system or policy) to meeting apparent demand for IT skills training.

The apparent failure of education supply to meet labour demand may be reflective of broader issues with New Zealand's education system. If the system follows demand then skills shortages would not be expected to persist.

Other questions about complementary factors might arise as to the ability and incentives of service firms to apply ICTs, particularly technologies such as online ordering and payment that are more difficult to adopt and may require customized solutions. For example:

- Do services businesses understand the skills they need to adopt ICT applications?

- Are there any barriers to outsourcing development of ICT applications in New Zealand? What does the market for ICT services look like in New Zealand? Is it high quality and competitive, or are there barriers to entry?

- Are there observable characteristics that differentiate service firms that have adopted advanced ICT applications from those that haven't?

Platforms and clouds

A relatively easy way for businesses to adopt advanced online services by making use of existing software platforms and cloud services. Platforms and cloud services provide specific functionality without the need to create new applications from scratch, although some work may need to be done to customise and integrate with existing systems. Typically, such services are rented rather than bought.

Important examples in e-commerce are shopping cart and payments services. These allow integration of online purchasing and payments into a firm's existing website. Well-known examples include Shopify, Big Cartel, PayPal and Stripe. Some platforms such as Square and Vend offer efficient online systems for taking electronic payments to "brick and mortar" retailers.

We think it would be interesting to examine adoption of online platforms and cloud services by businesses in the New Zealand services sector, to determine whether there are any barriers to the uptake of these technologies. Possible questions include:

- How do New Zealand services businesses typically adopt advanced ICT applications? Do they develop their own in-house, or buy off the shelf?

- Are there any barriers to entry for international platform and cloud services in the New Zealand market? For example, Stripe offers a payments platform that is very simple to integrate with an existing website, but it is not available in New Zealand. Do New Zealand payments regulations or other factors in the payments market create a barrier to entry for such services?

- Are there any barriers to the uptake of international platform and cloud services by New Zealand firms? For example, the New Zealand government's policy on cloud services appears to prevent firms from using offshore services when working on government contracts. Are there any other regulations or restrictions on the use of these services?

- Are locally supplied platform and cloud services available at prices and quality levels similar to international competitors? Is this market sufficiently developed and competitive, and if not, what are the barriers?

Diffusion

Roger Procter (2013) presented some evidence at the Productivity Commission's Symposium in July that the productivity dispersion of New Zealand firms is particularly skewed. Measured as the productivity of a firm at the 90th percentile divided by the productivity of a firm at the 10th percentile, the New Zealand average is 9.1, compared with no more than 3.5 in Denmark.

Procter's hypothesis was that trade and competition help discipline firms and that, in the relative absence of those factors that characterises the business environment for

many New Zealand firms, the pressures to innovate and improve productivity are reduced.

We hypothesise that divergence in the use of technology might help explain some of the variance in productivity between firms, again driven by a lack of competition. That is, we posit that the extent to which New Zealand businesses make productive use of technology varies widely between firms, with some at the global technology frontier, and others lagging very far behind. The soft competition for most firms in New Zealand may mean that firms are not pressed to make the most of their existing investments in ICT, nor to make further useful investments that might boost their productivity.

We think it would be interesting to explore this issue more fully. If our hypothesis is true, then policies to boost competition and trade would bring benefits in ICT use. In the absence of such policies or in the transition period while those policies take effect, work could usefully examine:

- What is the picture of ICT adoption amongst New Zealand firms, and how does it vary across industries and firm size? Is there any evidence for the hypothesis that industries that are more competitive or more open to trade are earlier or more effective users of ICTs?

- What explains why New Zealand service firms have not benefitted from their investments in ICTs as much as firms in the United States or Australia, as referenced by the Productivity Commission in its Interim Report? Is it just that larger firms are more likely to use ICTs effectively and New Zealand's firms are only of modest size?

- How do ICTs spread between and within service sectors? Do firms that lead the adoption of new technology or do new firms come in to an industry and disrupt existing business models? What existing initiatives are in play that might help encourage productive ICT use in industries and how effective are they?

- Are there any relevant barriers to adoption of ICTs within service industries that are relevant and could be removed? Or put more positively, between service industries, are there policies that help adoption of ICT applications that might explain any of the variation in diffusion?

References

Glass (2013), Internet usage and New Zealand productivity: improved take-up for improved prosperity?, Paper presented to the Productivity Commission's Productivity Symposium, July 2013

Procter (2013), Unpicking New Zealand's Productivity Paradox, Slides presented to the Productivity Commission's Productivity Symposium, July 2013